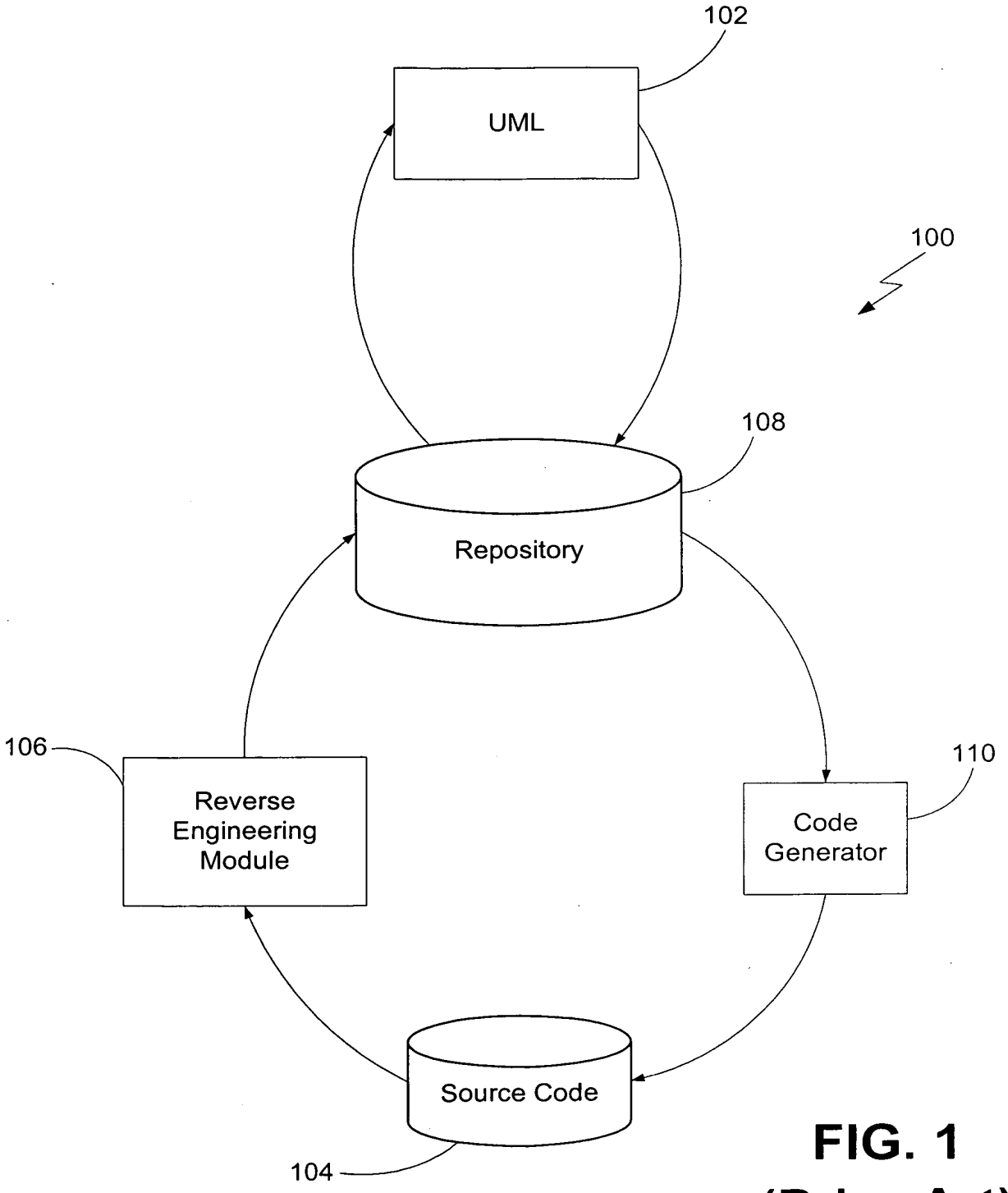

FIG. 1
(Prior Art)

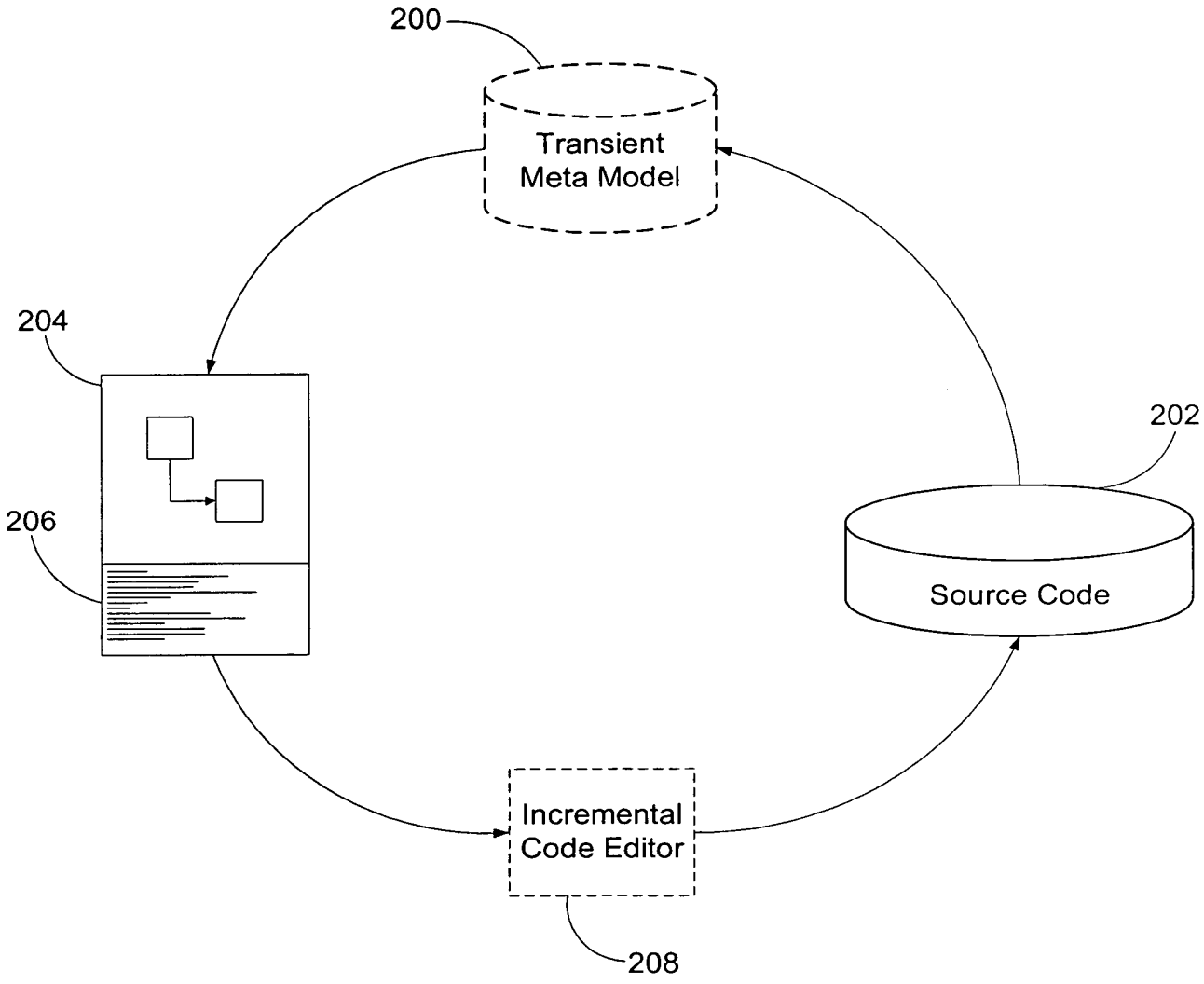
200
Transient
Meta Model
204
206
202
Source Code
Incremental
Code Editor
208

FIG. 2

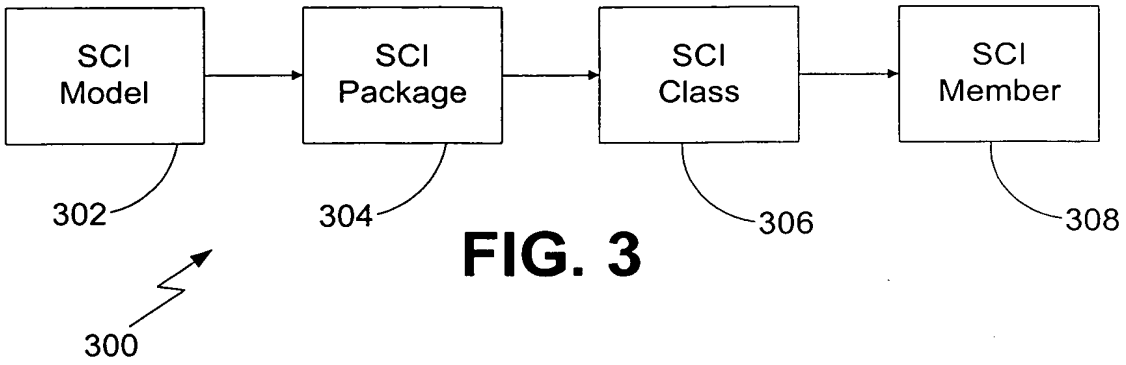

FIG. 3

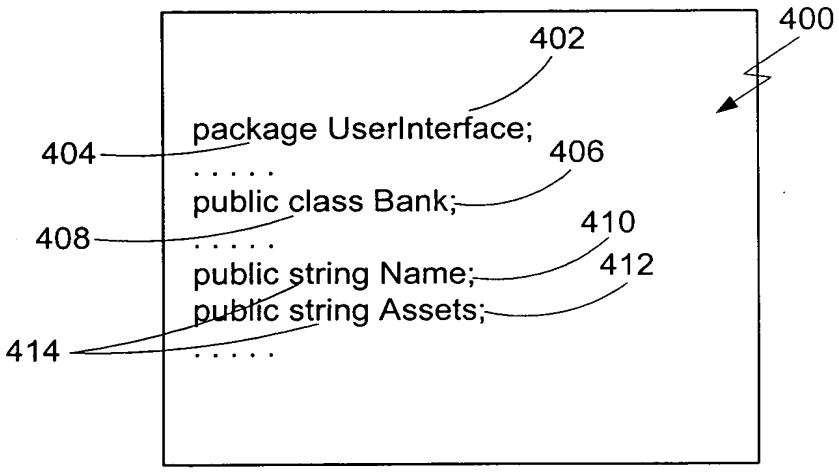

FIG. 4

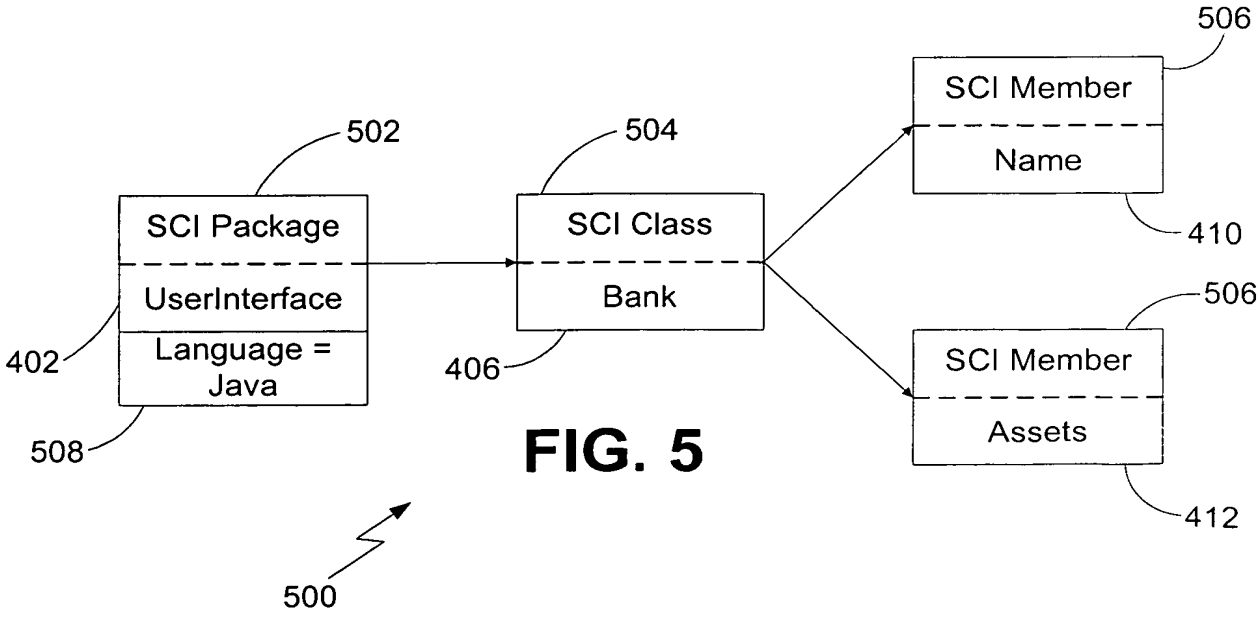

FIG. 5

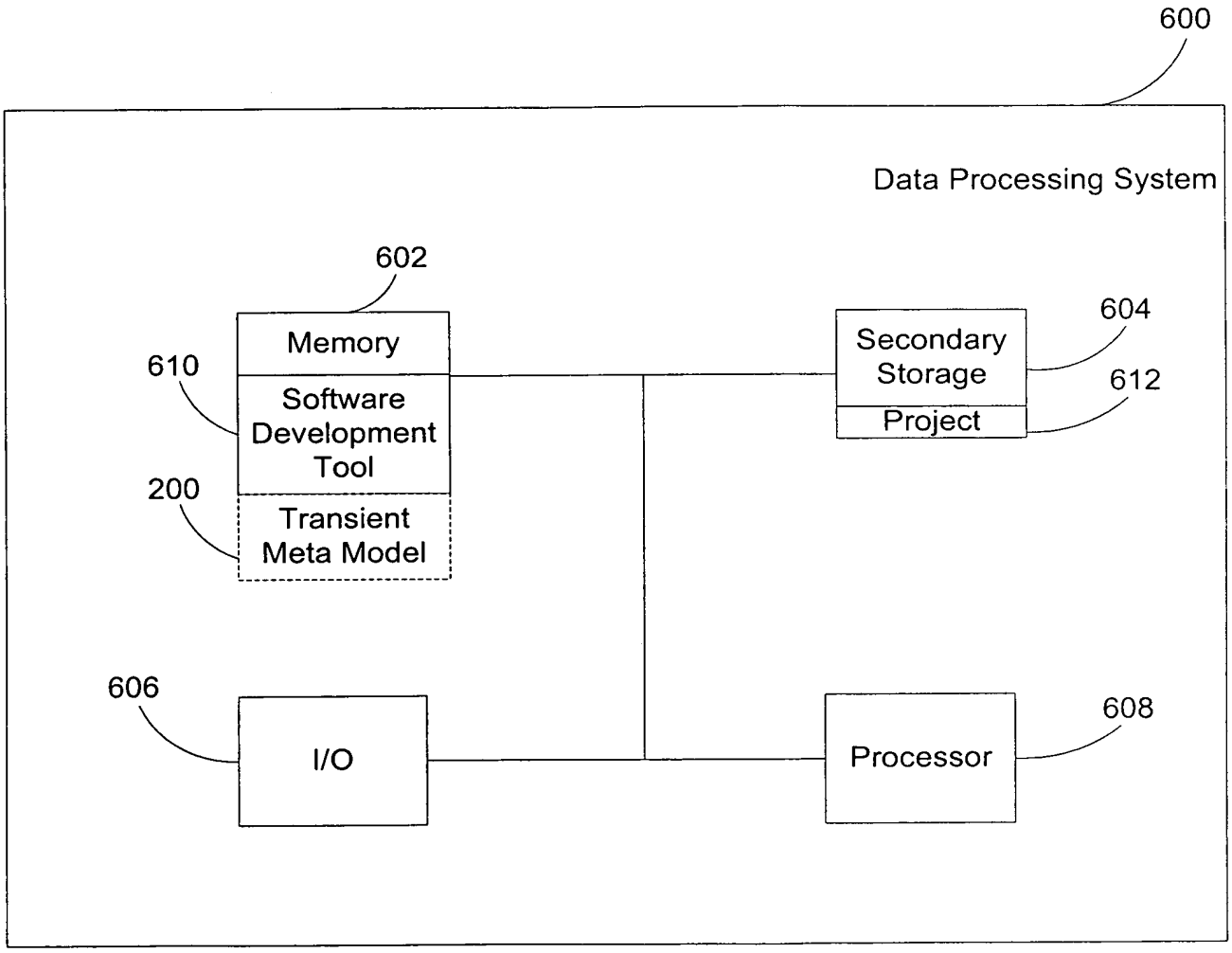
600
Data Processing System
602
Memory
610
Software Development Tool
200
Transient Meta Model
604
Secondary Storage
612
Project
606
I/O
608
Processor

FIG. 6

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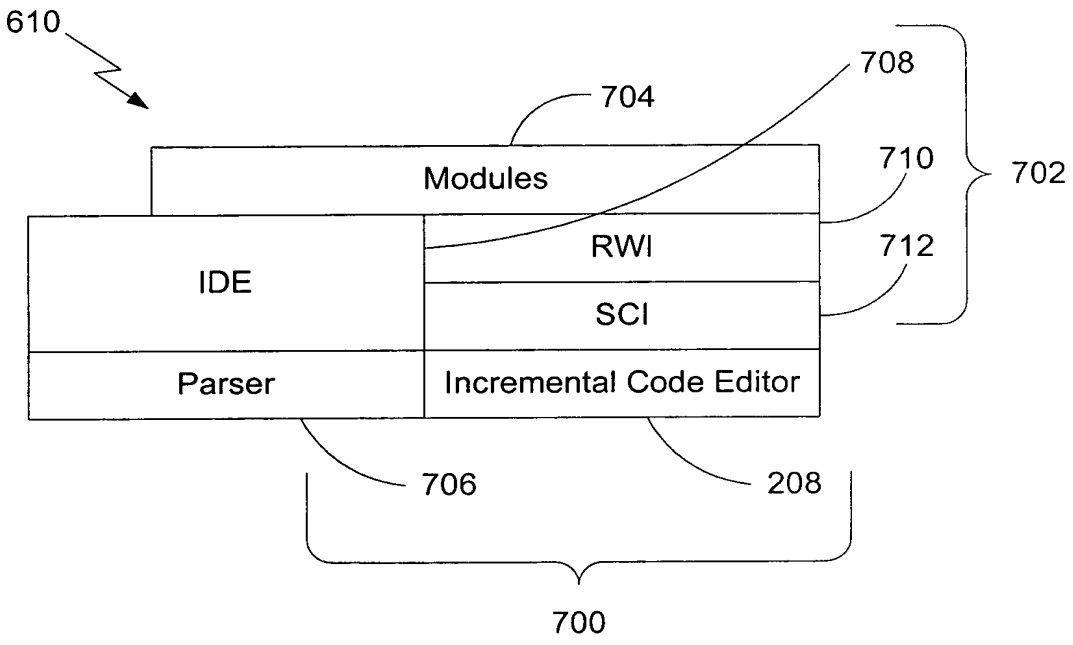


FIG. 7

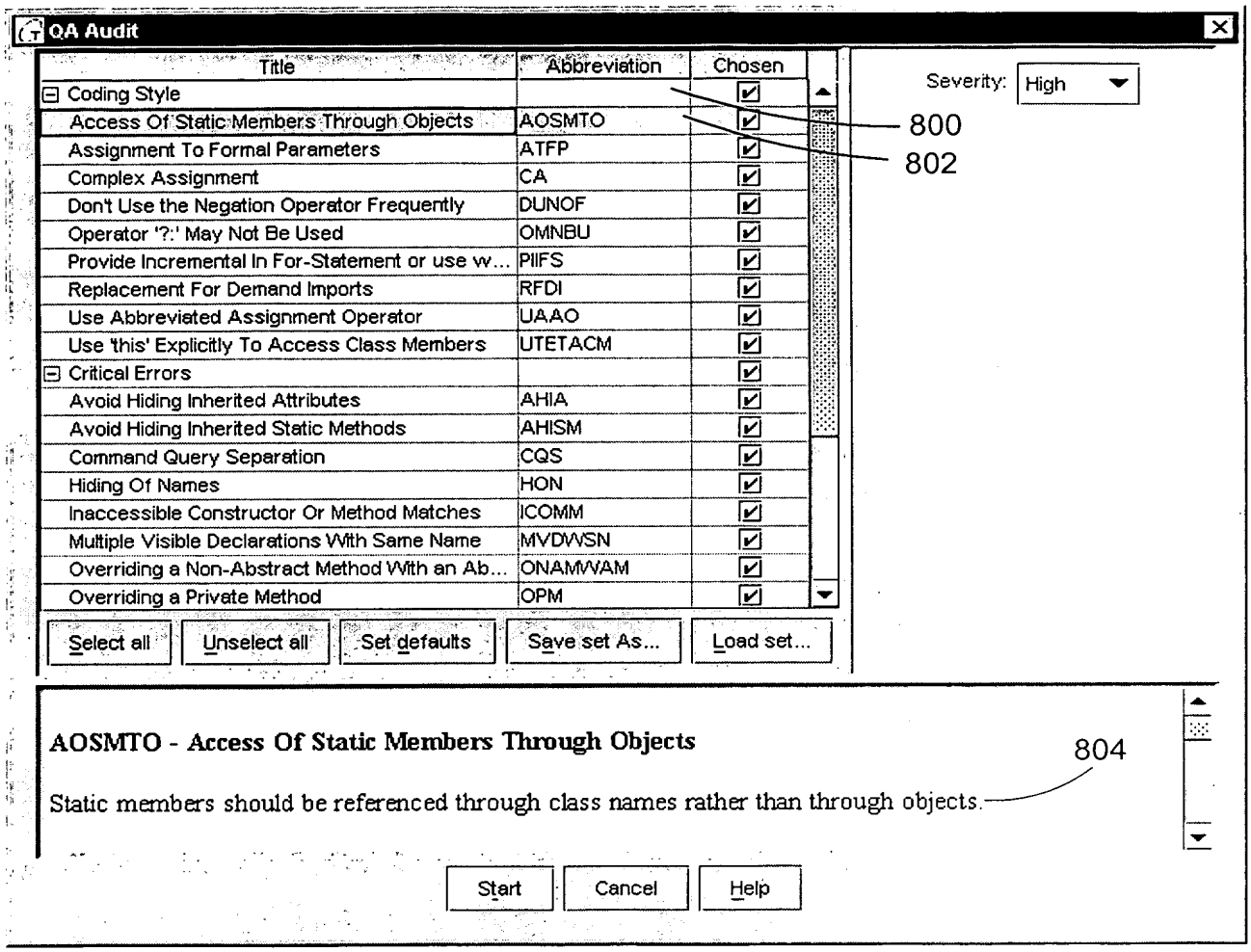

QA Audit
Title
Abbreviation
Chosen
Coding Style
Access Of Static Members Through Objects
AOSMTO
Assignment To Formal Parameters
ATFP
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Replacement For Demand Imports
RFDI
Use Abbreviated Assignment Operator
UAAO
Use 'this' Explicitly To Access Class Members
UTETACM
Critical Errors
Avoid Hiding Inherited Attributes
AHIA
Avoid Hiding Inherited Static Methods
AHISM
Command Query Separation
CQS
Hiding Of Names
HON
Inaccessible Constructor Or Method Matches
ICOMM
Multiple Visible Declarations With Same Name
MVDWSN
Overriding a Non-Abstract Method With an Ab...
ONAMWAM
Overriding a Private Method
OPM
Select all
Unselect all
Set defaults
Save set As...
Load set...
Severity:
High
800
802
AOSMTO - Access Of Static Members Through Objects
804
Static members should be referenced through class names rather than through objects.
Start
Cancel
Help

FIG. 8A

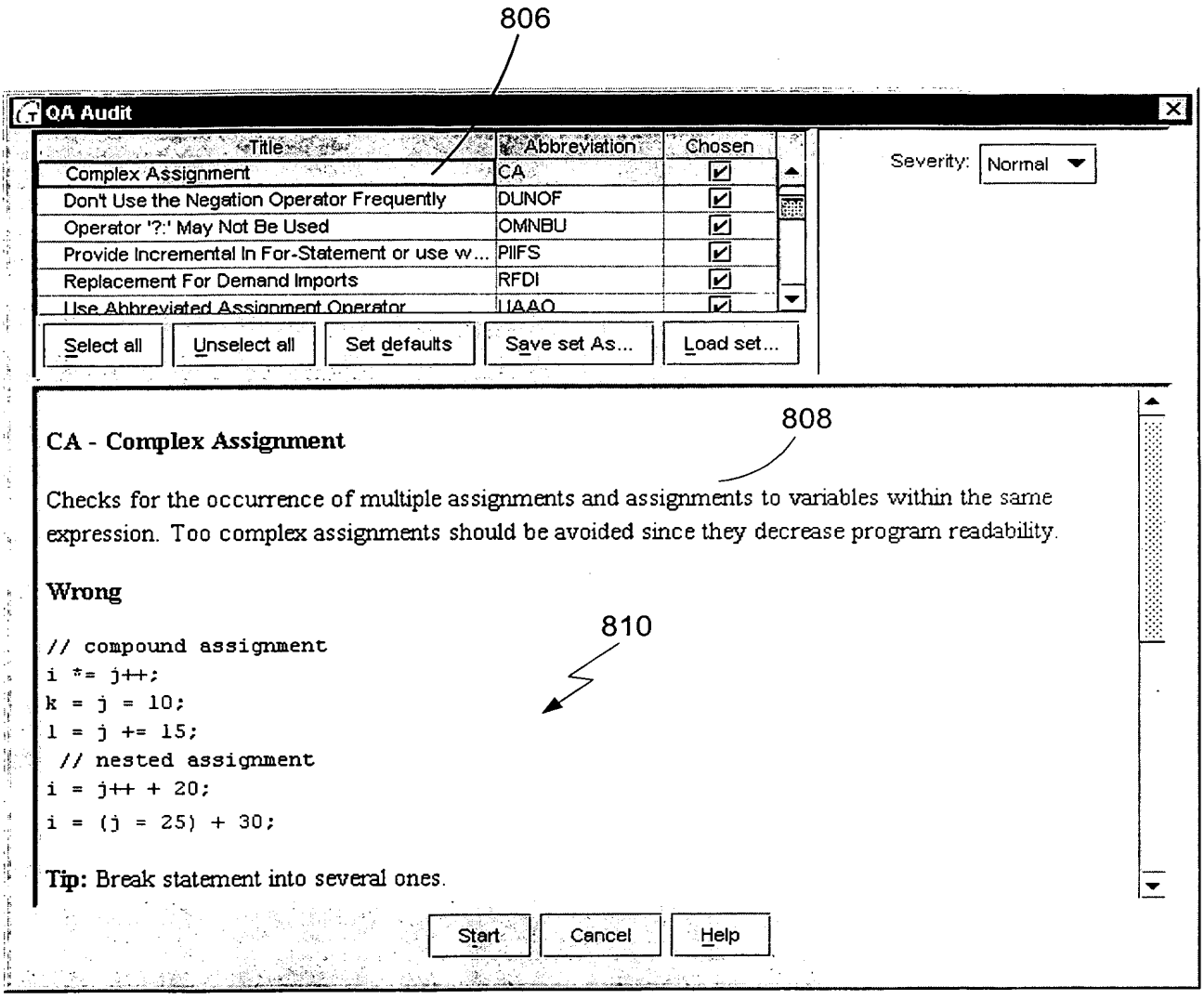

806
QA Audit
Title
Abbreviation
Chosen
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Replacement For Demand Imports
RFDI
Use Abbreviated Assignment Operator
UAAO
Severity:
Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
808
CA - Complex Assignment
Checks for the occurrence of multiple assignments and assignments to variables within the same expression. Too complex assignments should be avoided since they decrease program readability.
Wrong
810
// compound assignment
i *= j++;
k = j = 10;
l = j += 15;
// nested assignment
i = j++ + 20;
i = (j = 25) + 30;
Tip: Break statement into several ones.
Start
Cancel
Help

FIG. 8B

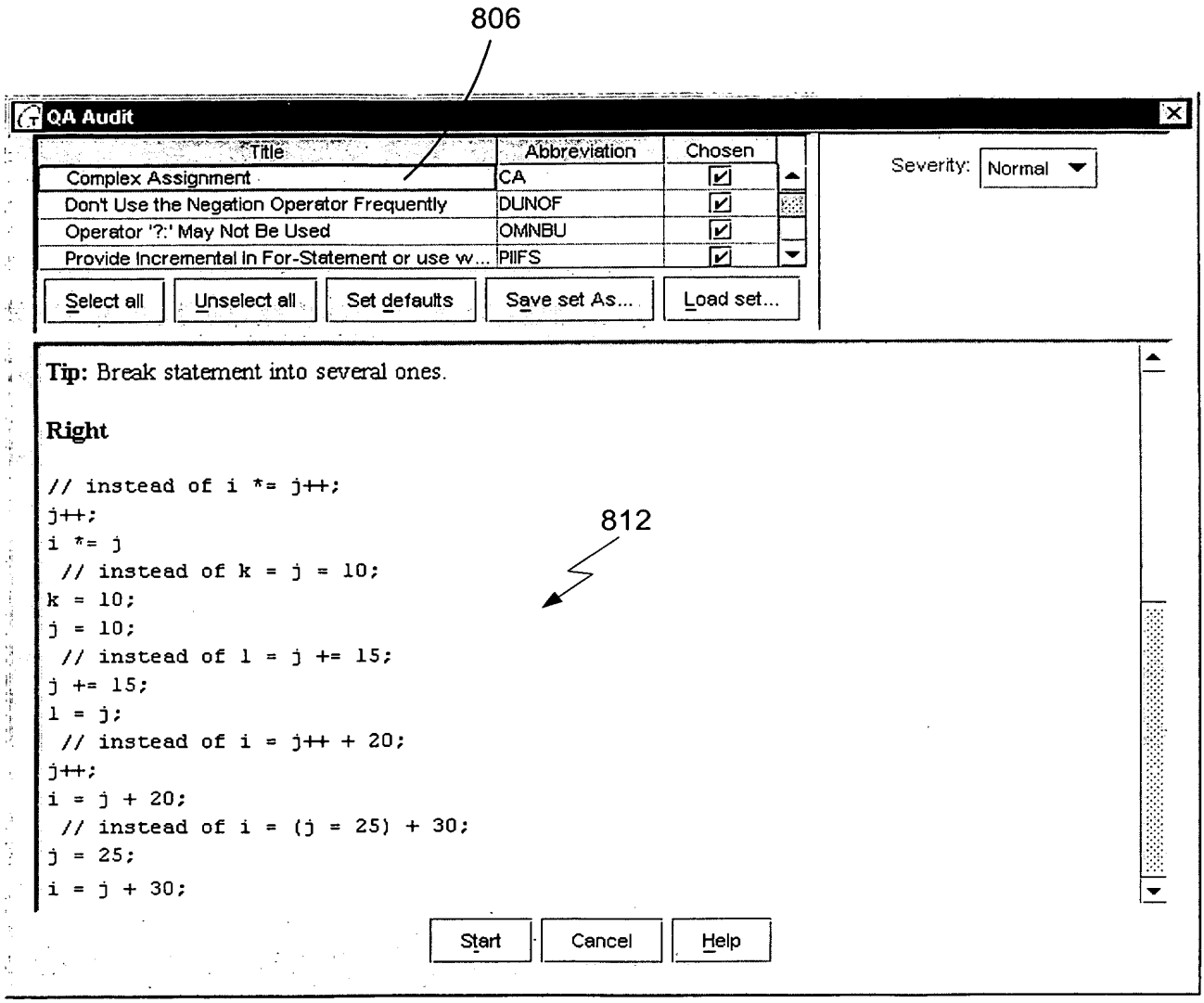

806
QA Audit
Title
Abbreviation
Chosen
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Severity:
Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
Tip: Break statement into several ones.
Right
// instead of i *= j++;
j++;
i *= j
// instead of k = j = 10;
k = 10;
j = 10;
// instead of l = j += 15;
j += 15;
l = j;
// instead of i = j++ + 20;
j++;
i = j + 20;
// instead of i = (j = 25) + 30;
j = 25;
i = j + 30;
812
Start
Cancel
Help

FIG. 8C

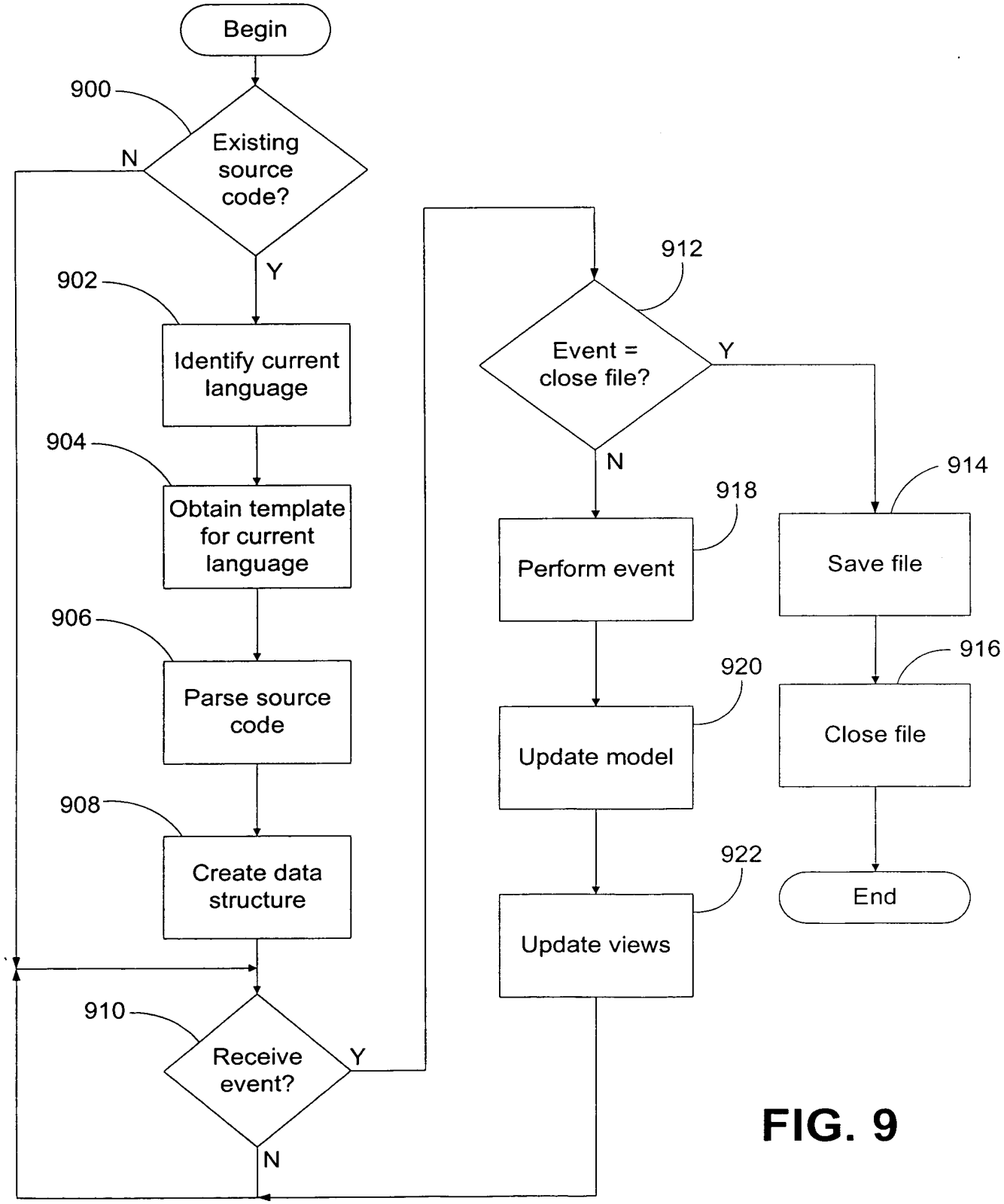

Begin
900
Existing source code?
N
Y
902
Identify current language
904
Obtain template for current language
906
Parse source code
908
Create data structure
910
Receive event?
Y
N
912
Event = close file?
Y
N
914
Save file
916
Close file
End
918
Perform event
920
Update model
922
Update views

FIG. 9

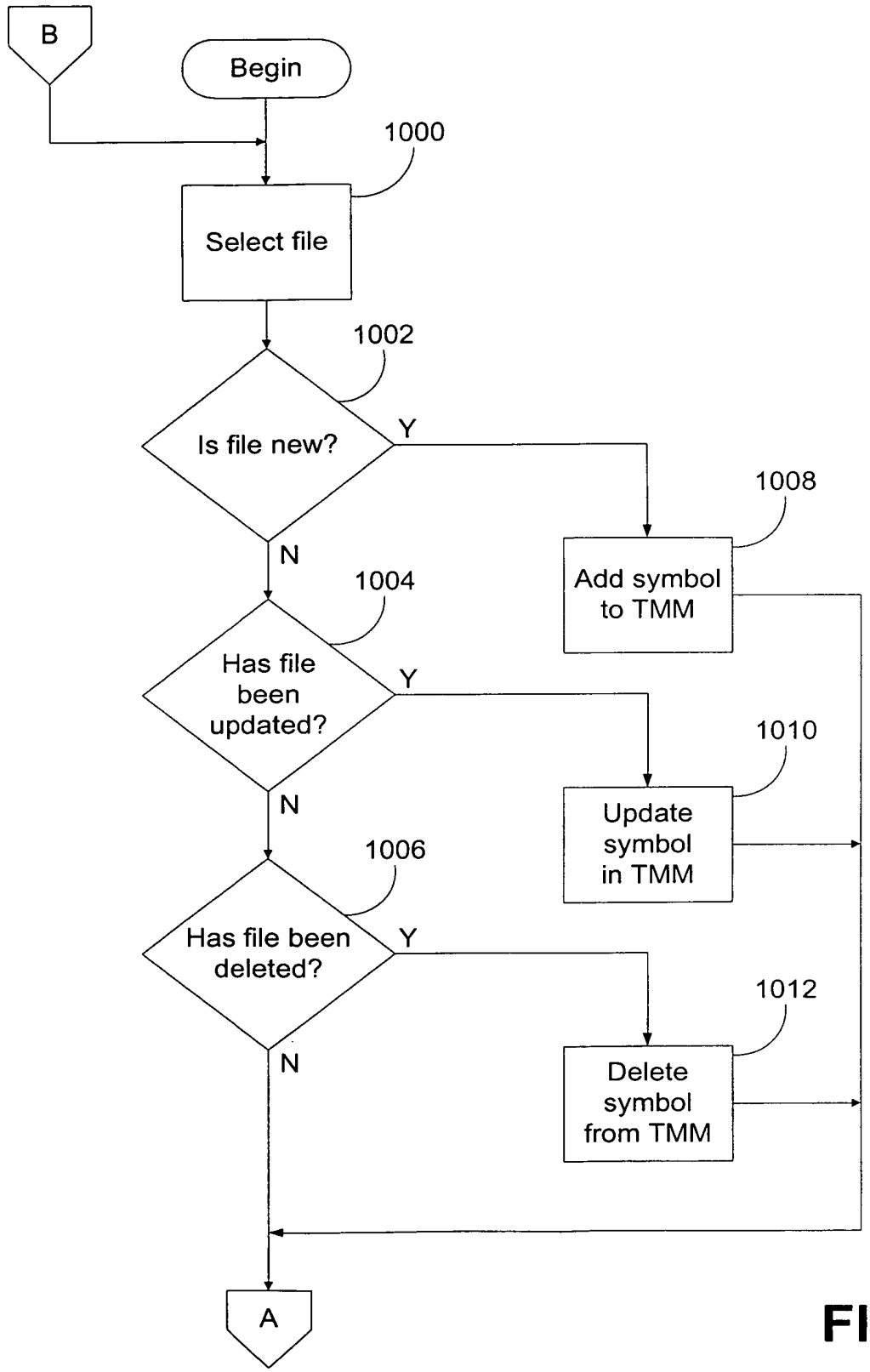

B
Begin
1000
Select file
1002
Is file new?
Y
N
1008
Add symbol to TMM
1004
Has file been updated?
Y
N
1010
Update symbol in TMM
1006
Has file been deleted?
Y
N
1012
Delete symbol from TMM
A

FIG. 10A

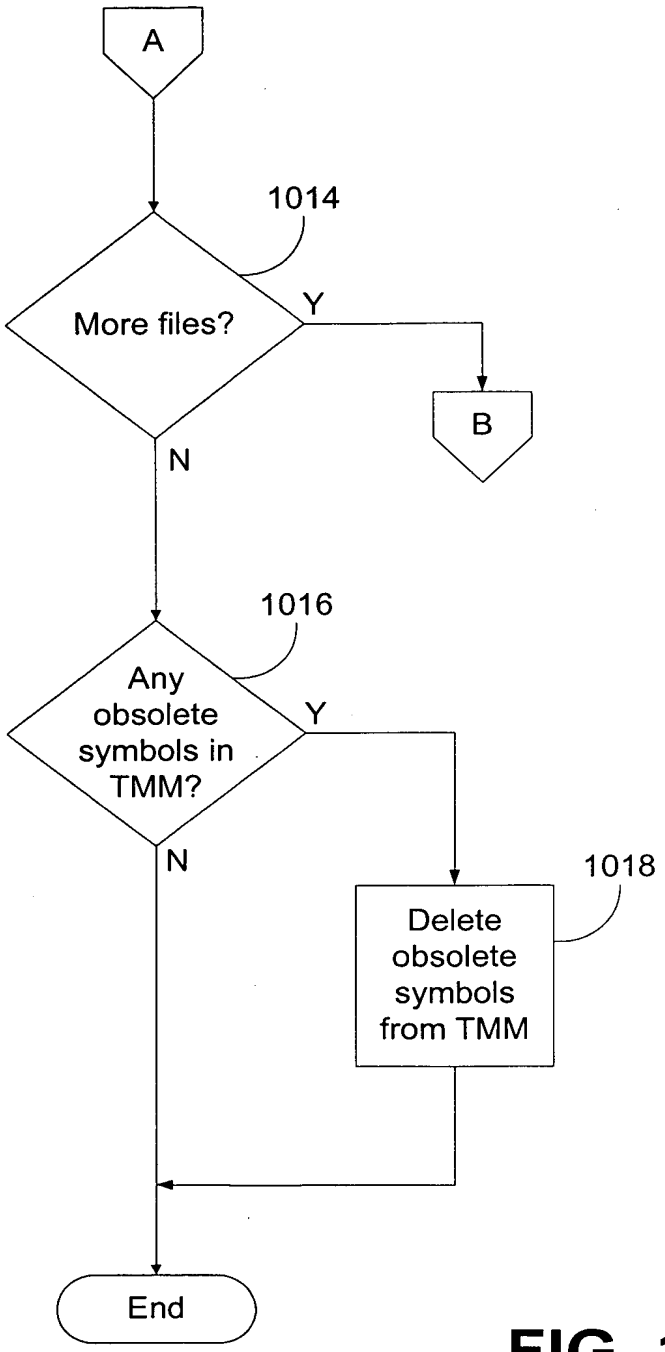

A
1014
More files?
Y
B
N
1016
Any obsolete symbols in TMM?
Y
N
1018
Delete obsolete symbols from TMM
End

FIG. 10B

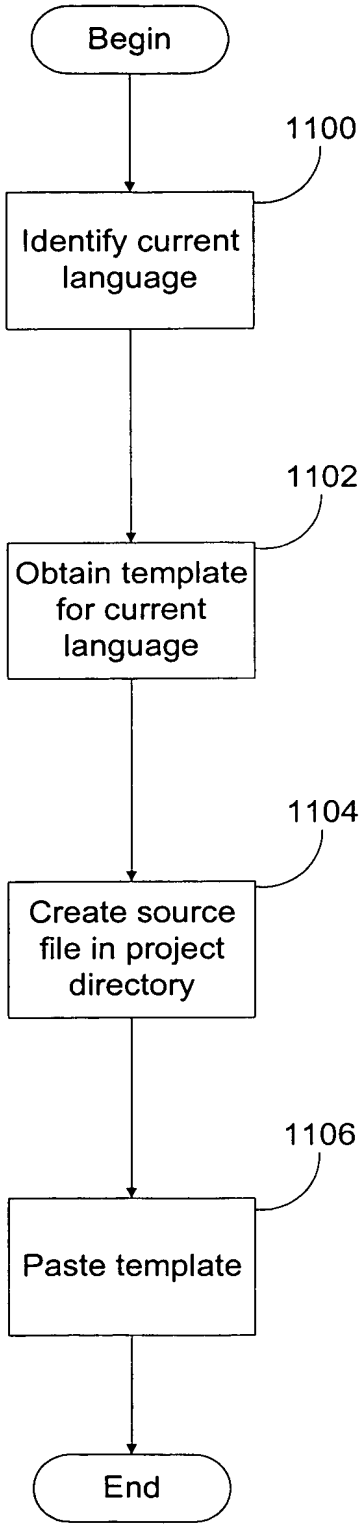

Begin
1100
Identify current language
1102
Obtain template for current language
1104
Create source file in project directory
1106
Paste template
End

FIG. 11

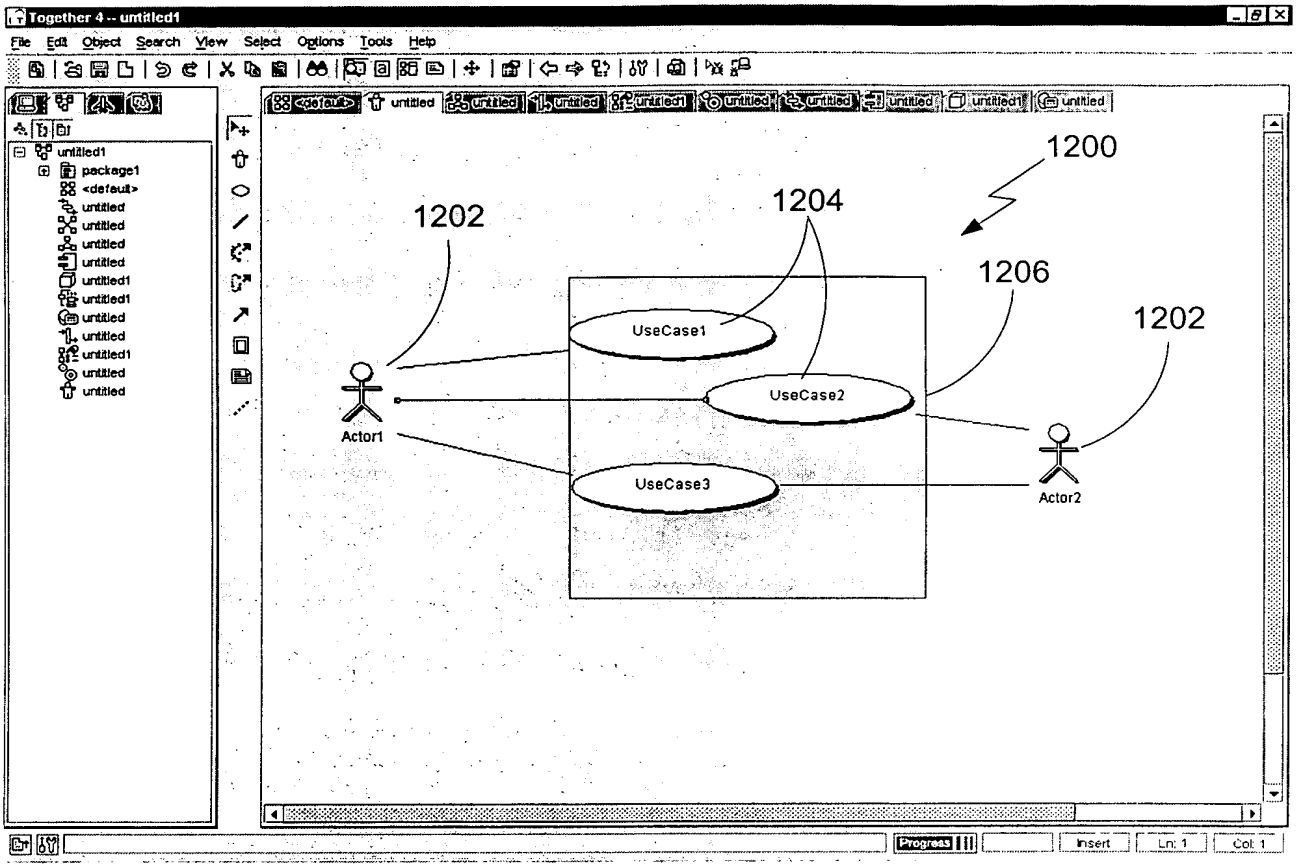

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
1200
1202
1204
1206
1202
UseCase1
UseCase2
UseCase3
Actor1
Actor2
Insert
Ln: 1
Col: 1

FIG. 12

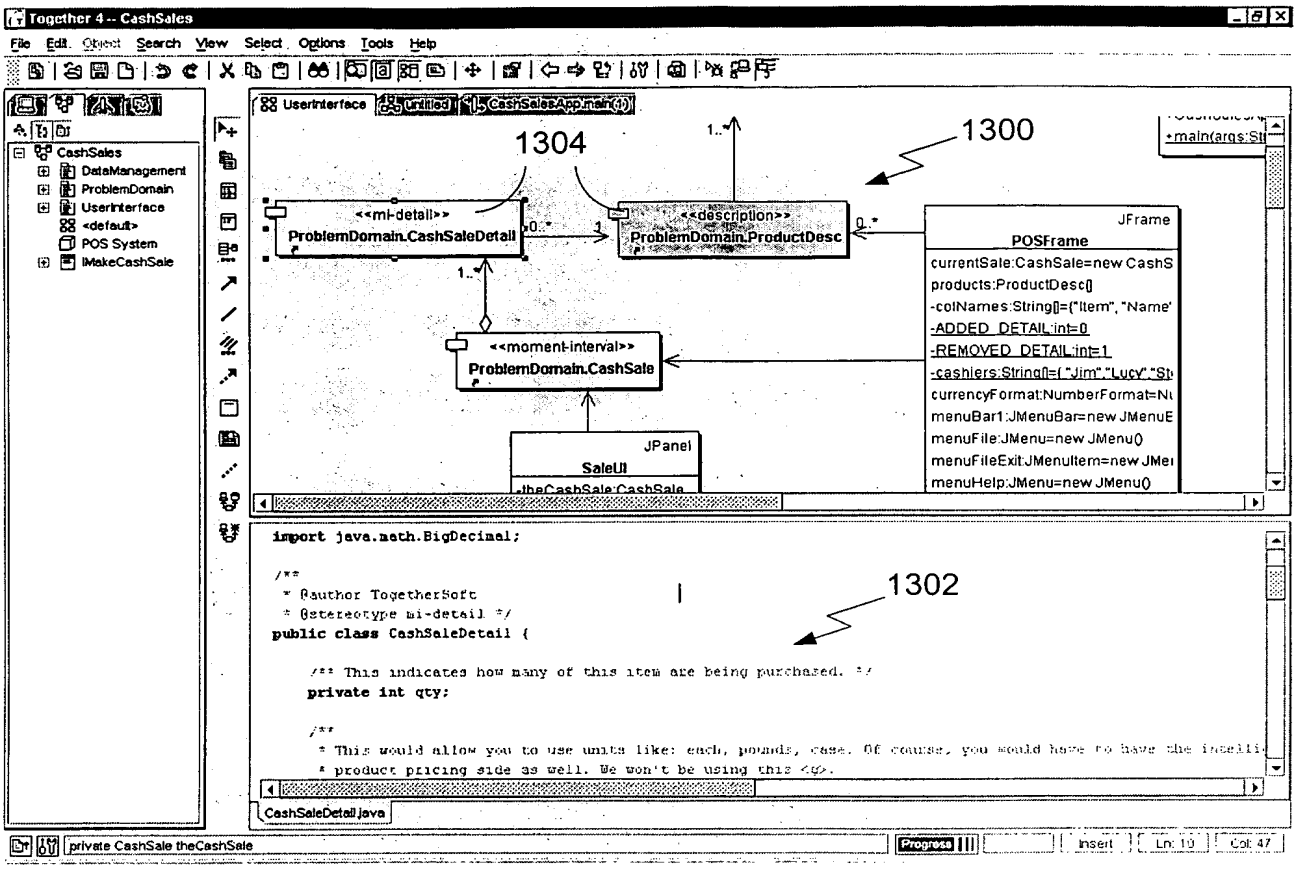

Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
IMakeCashSale
UserInterface
Untitled
CashSalesApp.main()
1304
1300
<<mi-detail>>
ProblemDomain.CashSaleDetail
<<description>>
ProblemDomain.ProductDesc
JFrame
POSFrame
currentSale:CashSale=new CashS
products:ProductDesc[]
-colNames:String[]={"Item","Name"
-ADDED_DETAIL:int=0
-REMOVED_DETAIL:int=1
-cashiers:String[]={"Jim","Lucy","St
currencyFormat:NumberFormat=Nu
menuBar1:JMenuBar=new JMenuE
menuFile:JMenu=new JMenu()
menuFileExit:JMenuItem=new JMer
menuHelp:JMenu=new JMenu()
<<moment-interval>>
ProblemDomain.CashSale
JPanel
SaleUI
1302
import java.math.BigDecimal;
/**
* @author TogetherSoft
* @stereotype mi-detail */
public class CashSaleDetail {
/** This indicates how many of this item are being purchased. */
private int qty;
CashSaleDetail.java
private CashSale theCashSale
Progress
Insert
Ln: 10
Col: 47

FIG. 13

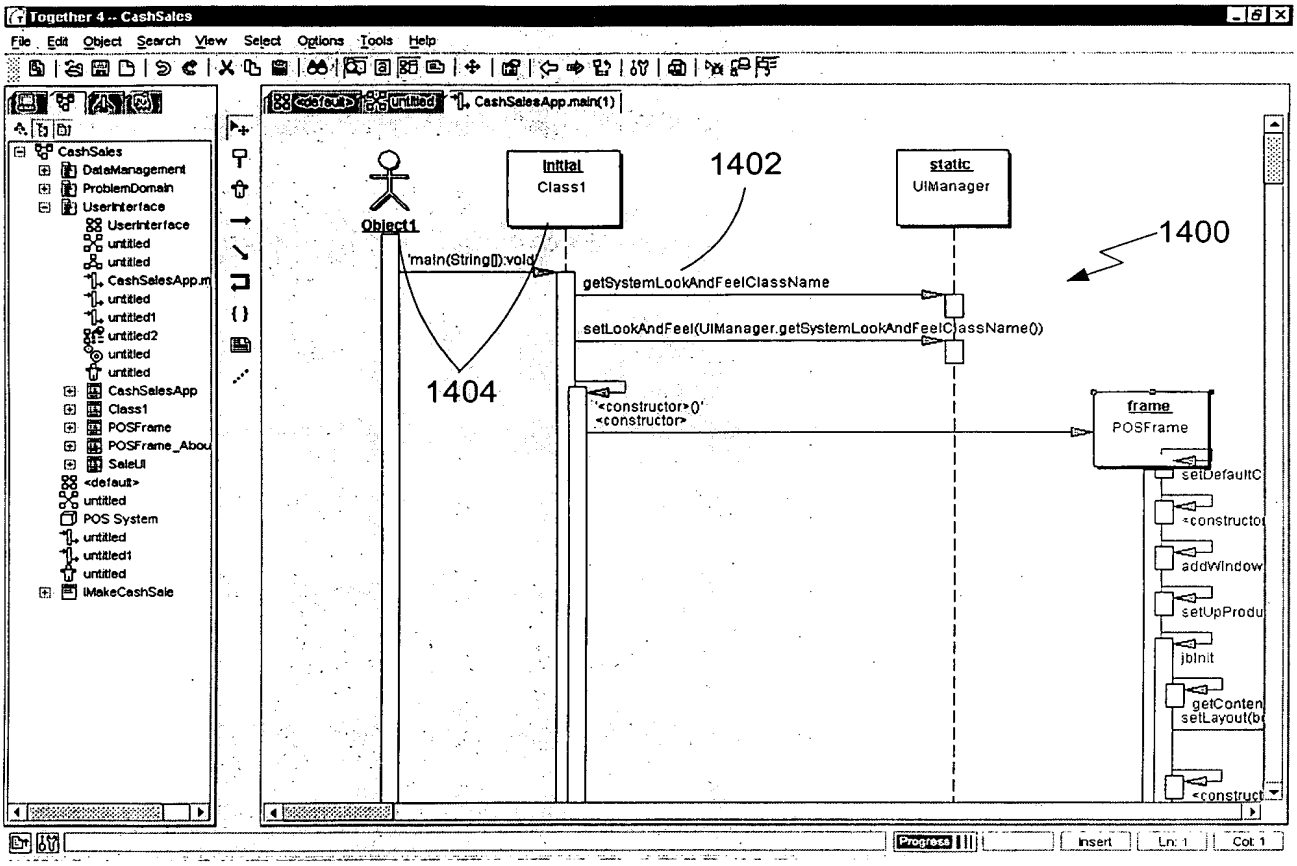

Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp.m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
<default>
untitled
CashSalesApp.main(1)
Object1
Initial
Class1
1402
static
UIManager
1400
'main(String[]):void'
getSystemLookAndFeelClassName
setLookAndFeel(UIManager.getSystemLookAndFeelClassName())
1404
'<constructor>()'
<constructor>
frame
POSFrame
setDefaultC
<constructo
addWindow
setUpProdu
jbInit
getConten
setLayout(b
<construct
Progress
Insert
Ln: 1
Col: 1

FIG. 14

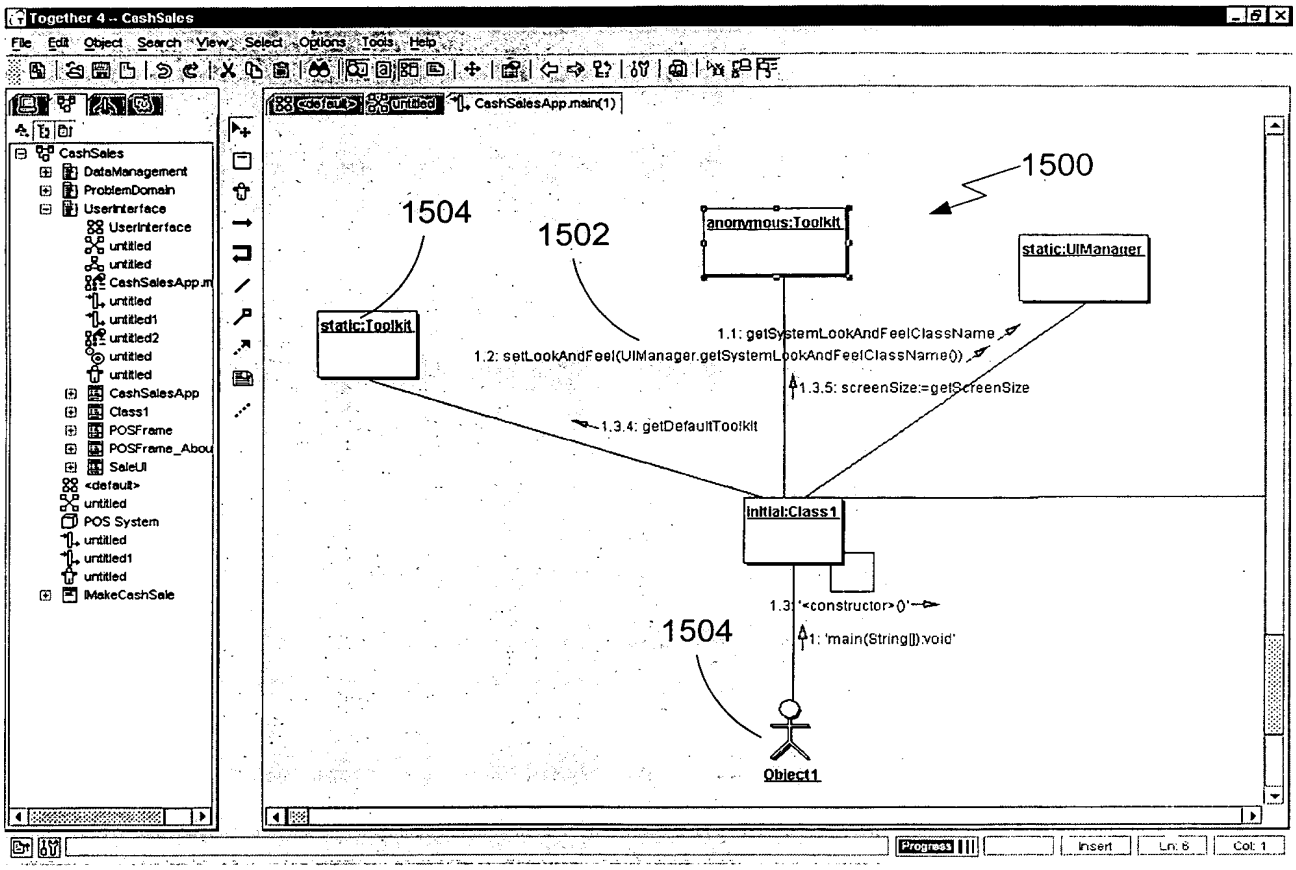

Together 4 -- CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp.m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
<default>
untitled
CashSalesApp.main(1)
1500
1504
1502
anonymous:Toolkit
static:UIManager
static:Toolkit
1.1: getSystemLookAndFeelClassName
1.2: setLookAndFeel(UIManager.getSystemLookAndFeelClassName())
1.3.5: screenSize:=getScreenSize
1.3.4: getDefaultToolkit
initial:Class1
1.3: '<constructor>()'
1: 'main(String[]):void'
1504
Object1
Progress
Insert
Ln: 6
Col: 1

FIG. 15

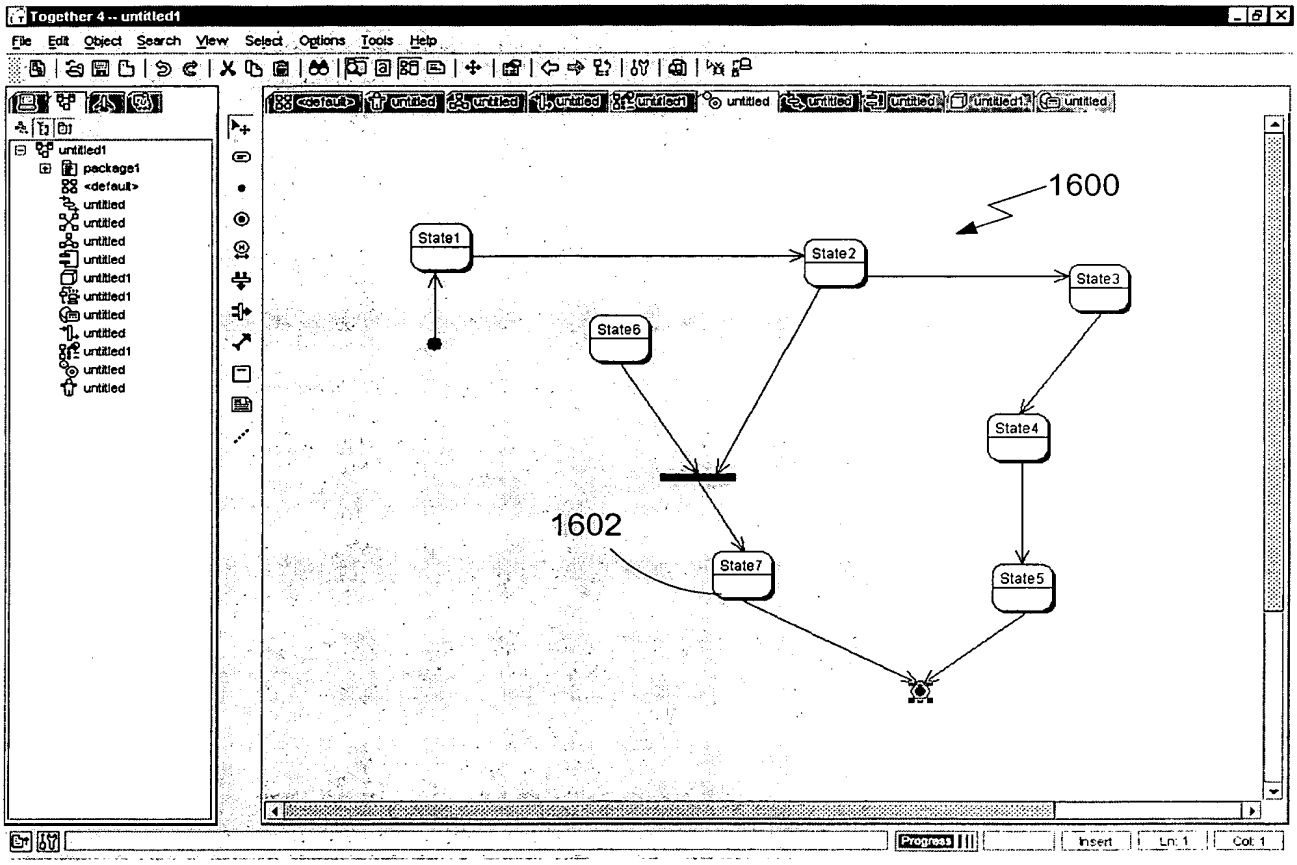

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
1600
State1
State2
State3
State4
State5
State6
State7
1602
Progress
Insert
Ln: 1
Col: 1

FIG. 16

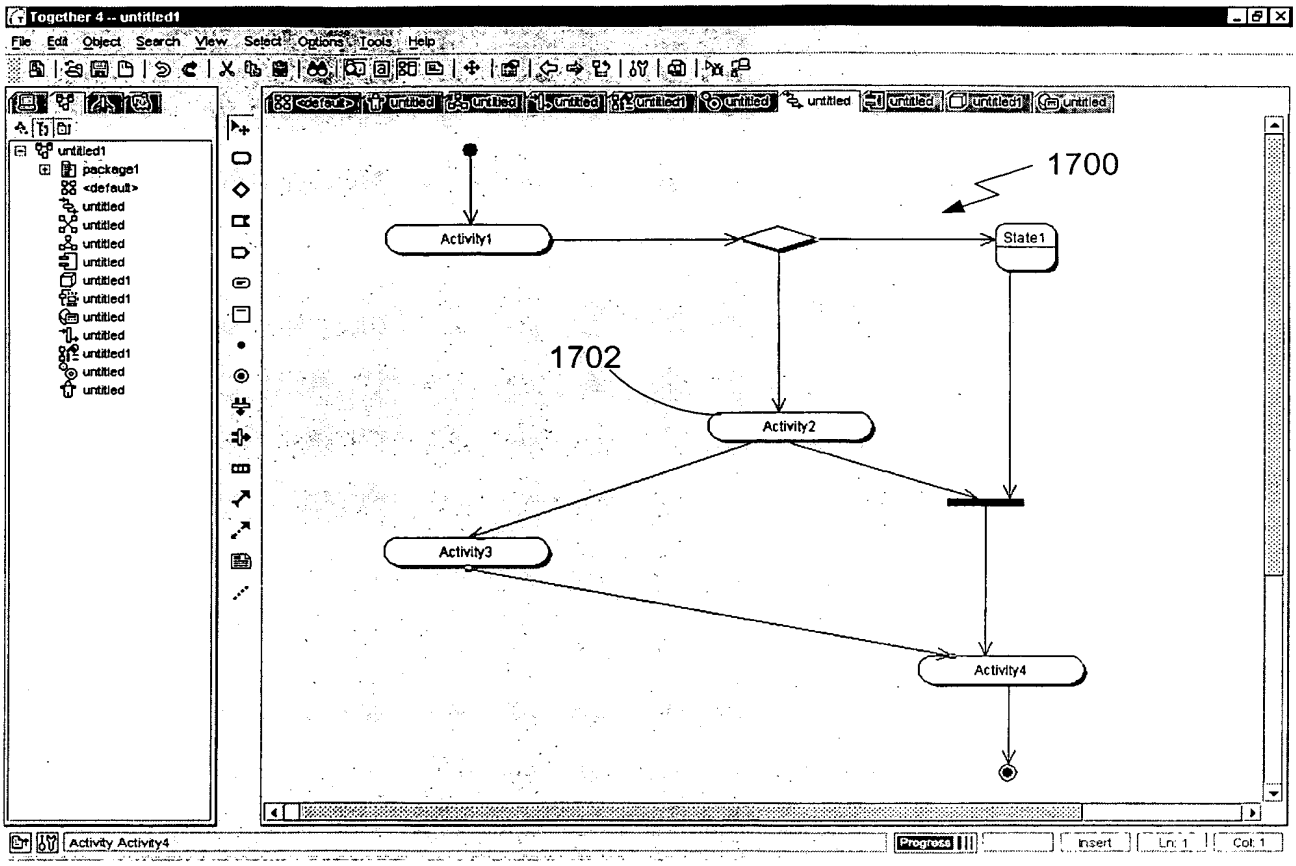

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled1
1700
Activity1
State1
1702
Activity2
Activity3
Activity4
Activity Activity4
Insert
Ln: 1
Col: 1

FIG. 17

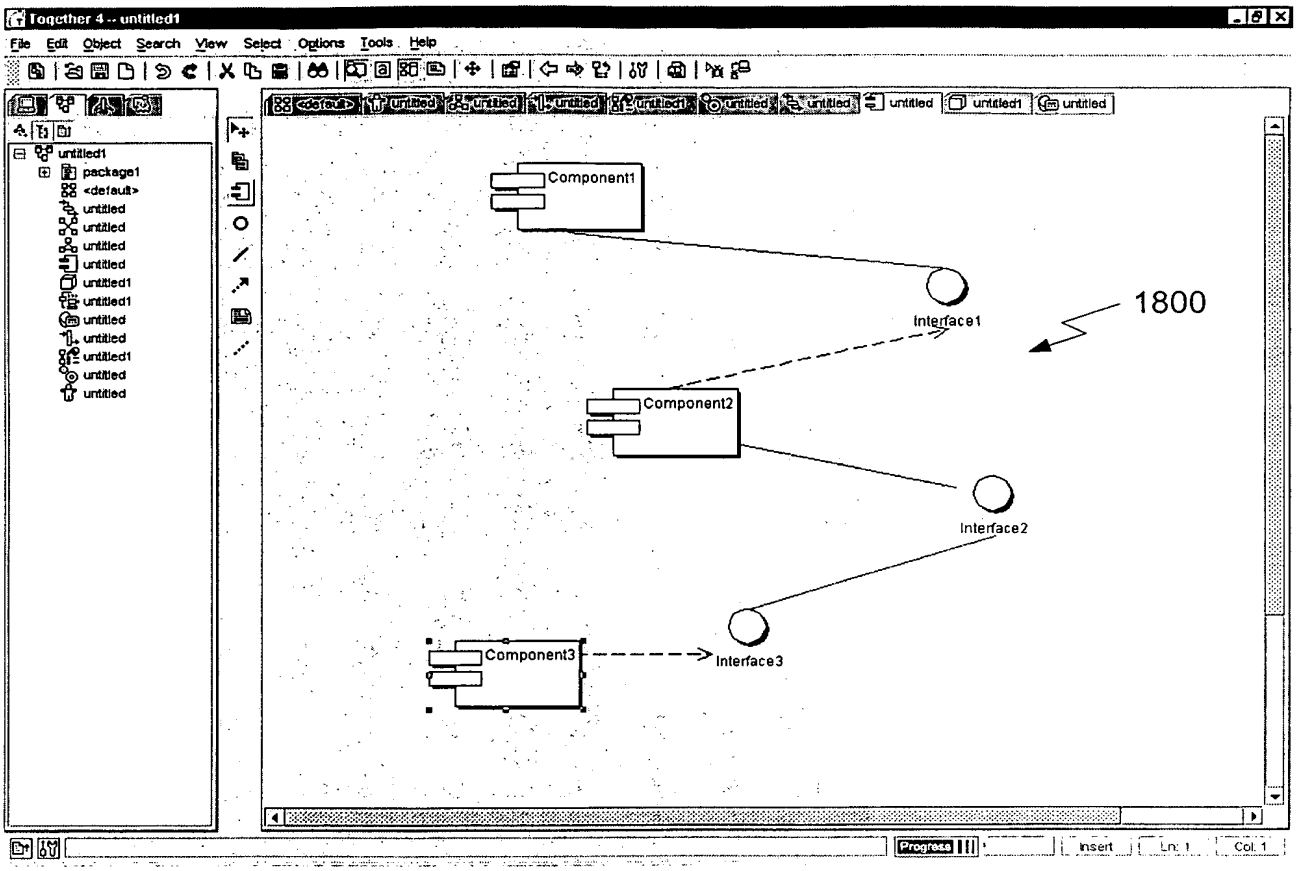

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled1
Component1
Interface1
1800
Component2
Interface2
Component3
Interface3
Progress
Insert

FIG. 18

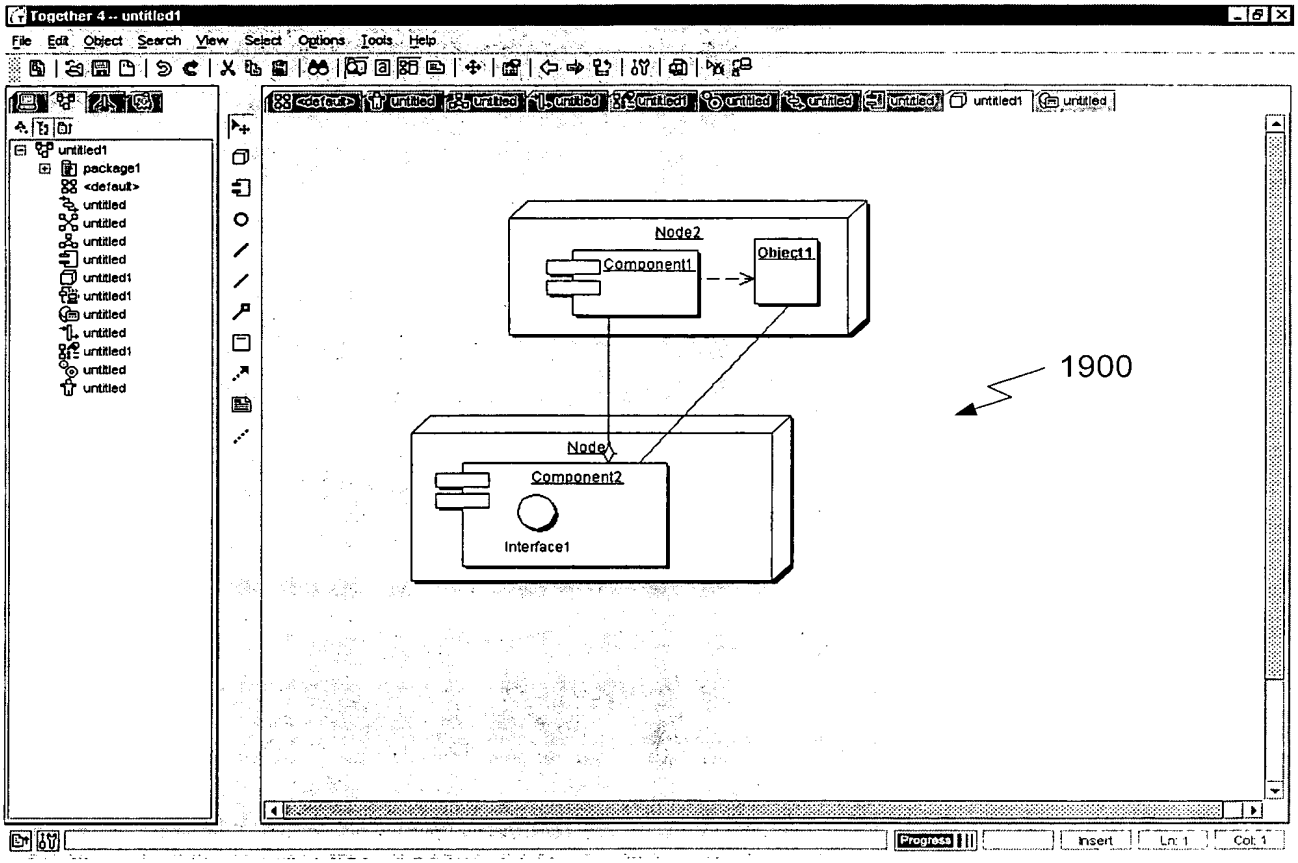
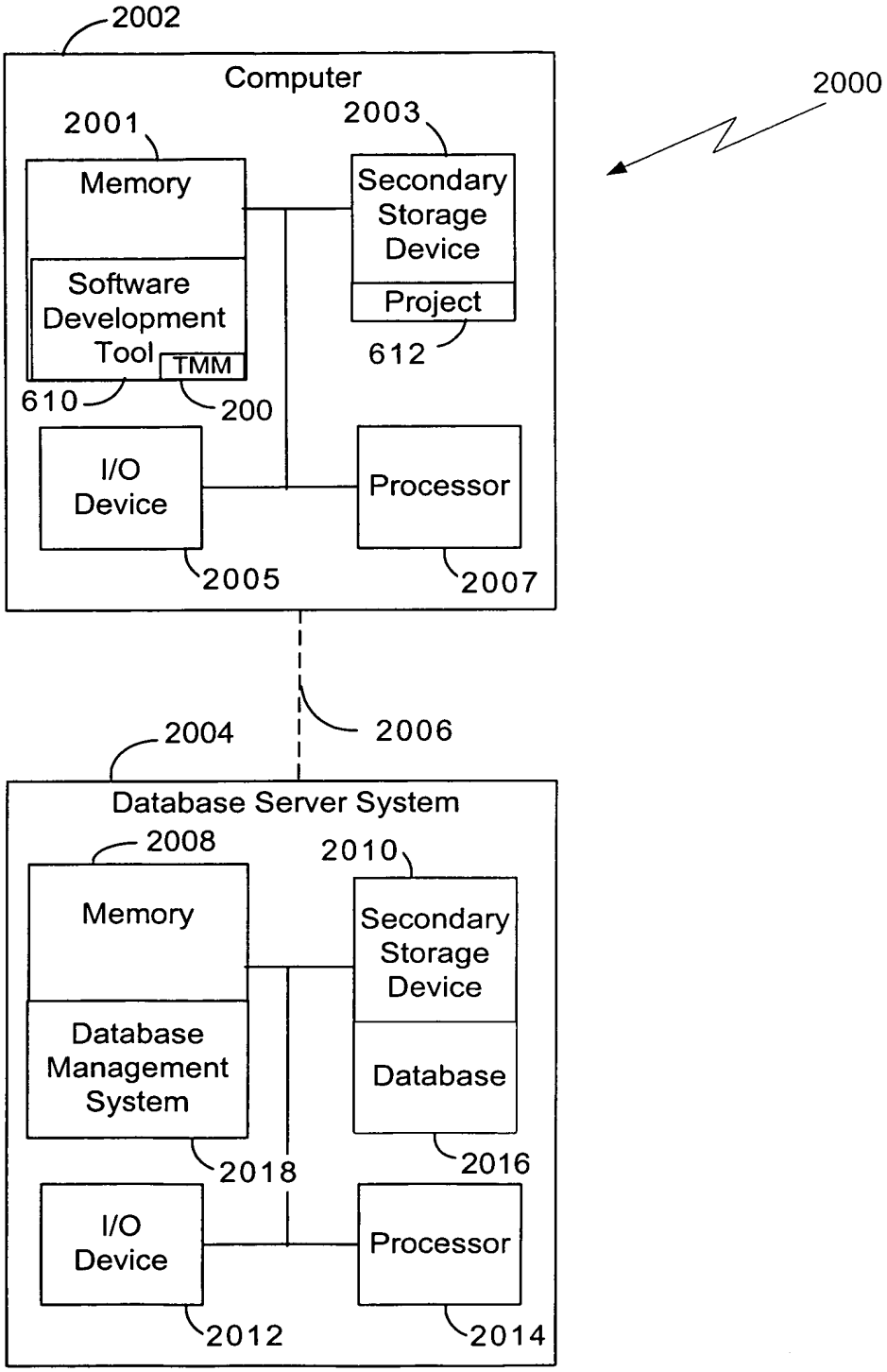

Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled1
Node2
Component1
Object1
Node
Component2
Interface1
1900
Progress
Insert
Ln: 1
Col: 1

FIG. 19

FIG. 20


2002
Computer
2000
2001
2003
Memory
Secondary Storage Device
Software Development Tool
TMM
Project
612
610
200
I/O Device
Processor
2005
2007
2004
2006
Database Server System
2008
2010
Memory
Secondary Storage Device
Database Management System
Database
2018
2016
I/O Device
Processor
2012
2014

Docket No. 50277-0800

FIG. 21A

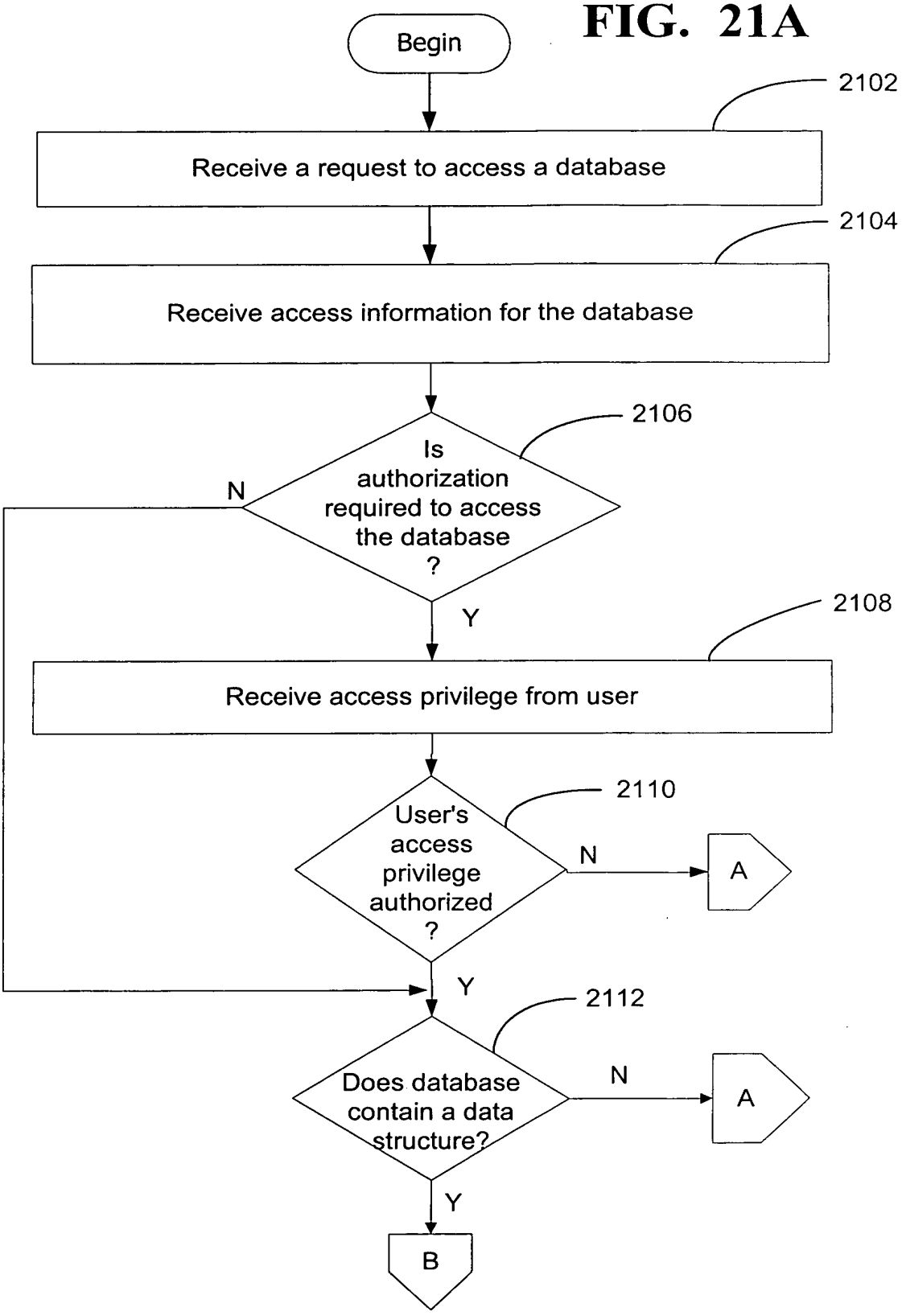


FIG. 21B

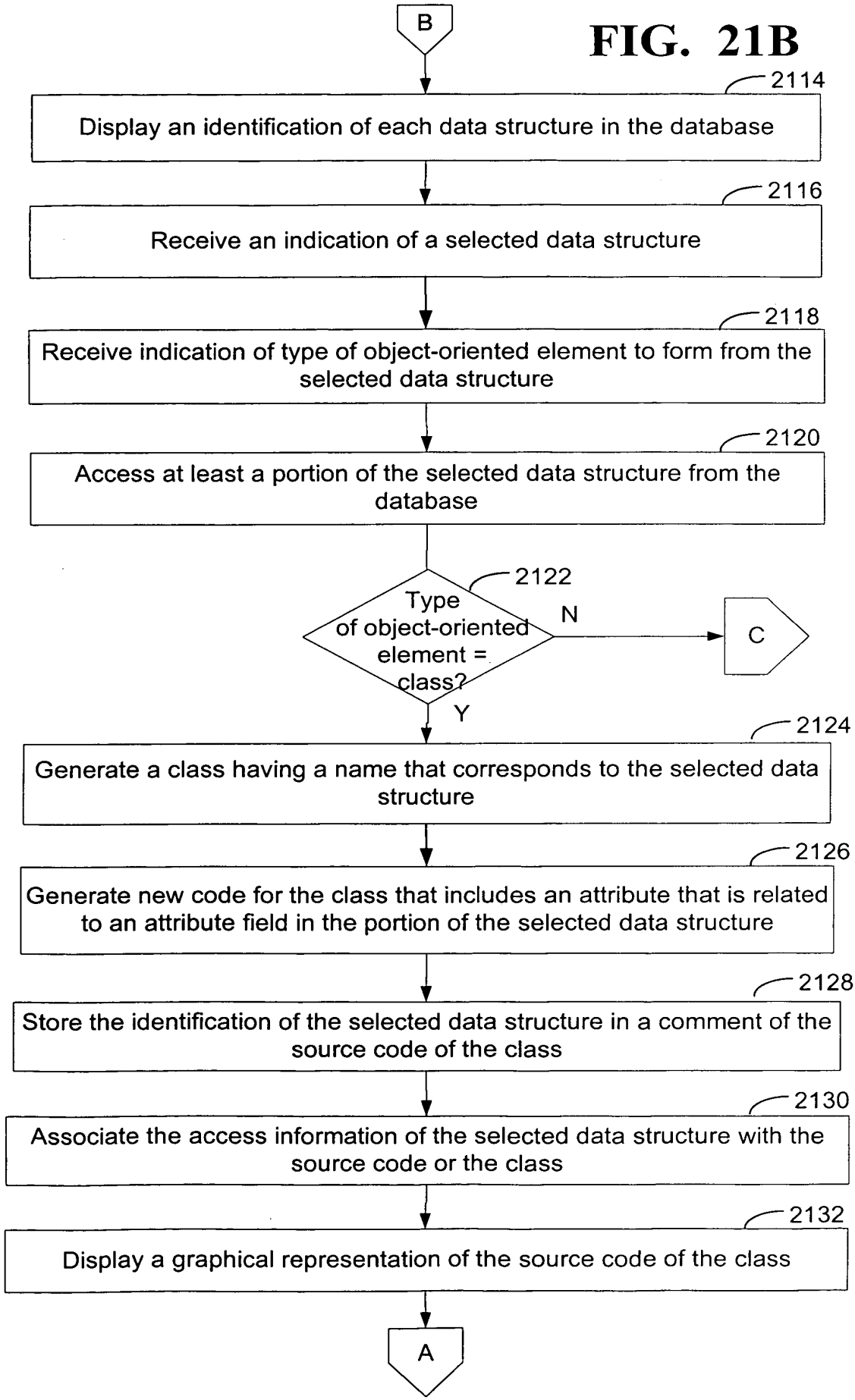

B
2114
Display an identification of each data structure in the database
2116
Receive an indication of a selected data structure
2118
Receive indication of type of object-oriented element to form from the selected data structure
2120
Access at least a portion of the selected data structure from the database
2122
Type of object-oriented element = class?
N
C
Y
2124
Generate a class having a name that corresponds to the selected data structure
2126
Generate new code for the class that includes an attribute that is related to an attribute field in the portion of the selected data structure
2128
Store the identification of the selected data structure in a comment of the source code of the class
2130
Associate the access information of the selected data structure with the source code or the class
2132
Display a graphical representation of the source code of the class
A

FIG. 21C

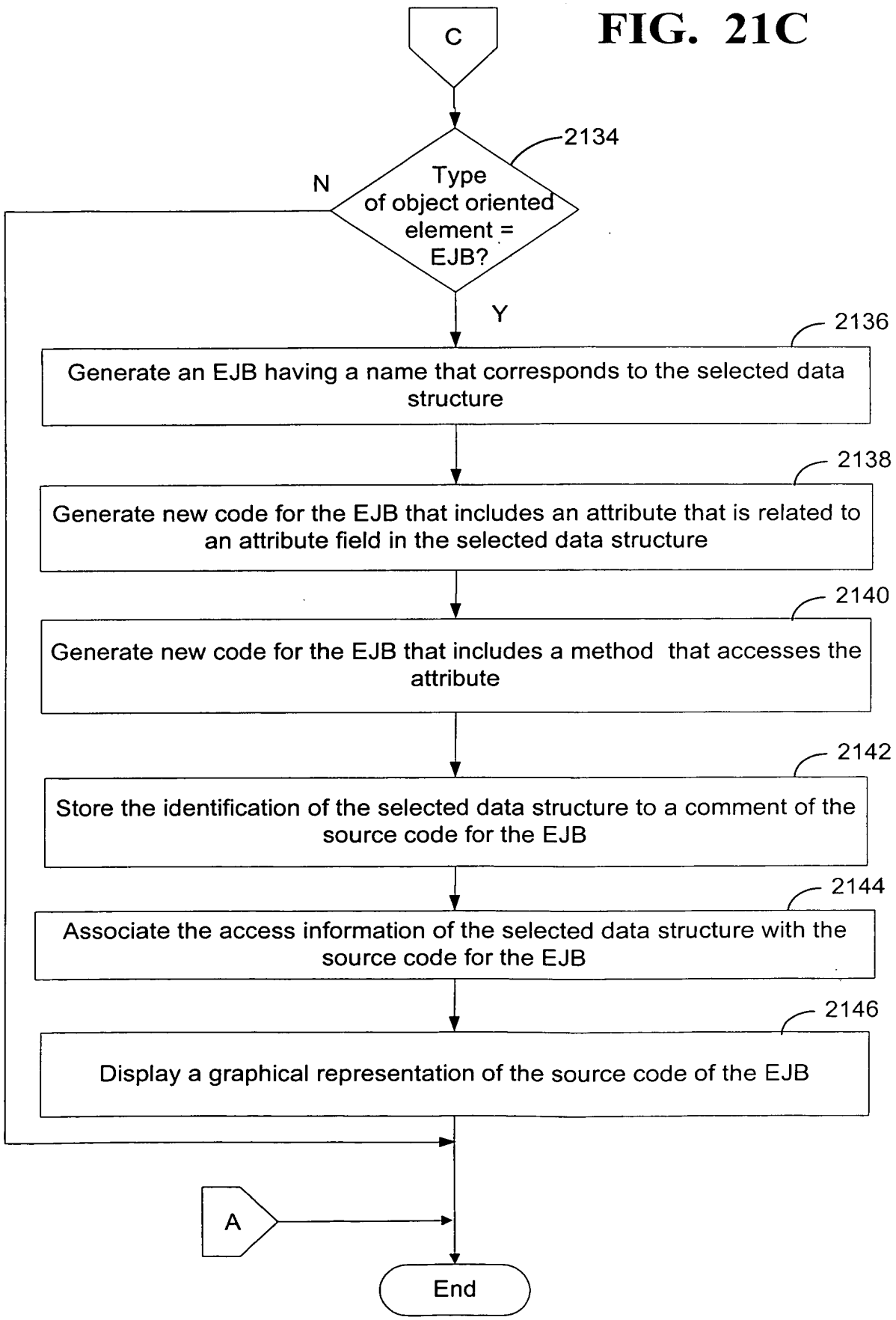

C
2134
Type of object oriented element = EJB?
N
Y
2136
Generate an EJB having a name that corresponds to the selected data structure
2138
Generate new code for the EJB that includes an attribute that is related to an attribute field in the selected data structure
2140
Generate new code for the EJB that includes a method that accesses the attribute
2142
Store the identification of the selected data structure to a comment of the source code for the EJB
2144
Associate the access information of the selected data structure with the source code for the EJB
2146
Display a graphical representation of the source code of the EJB
A
End

FIG. 22

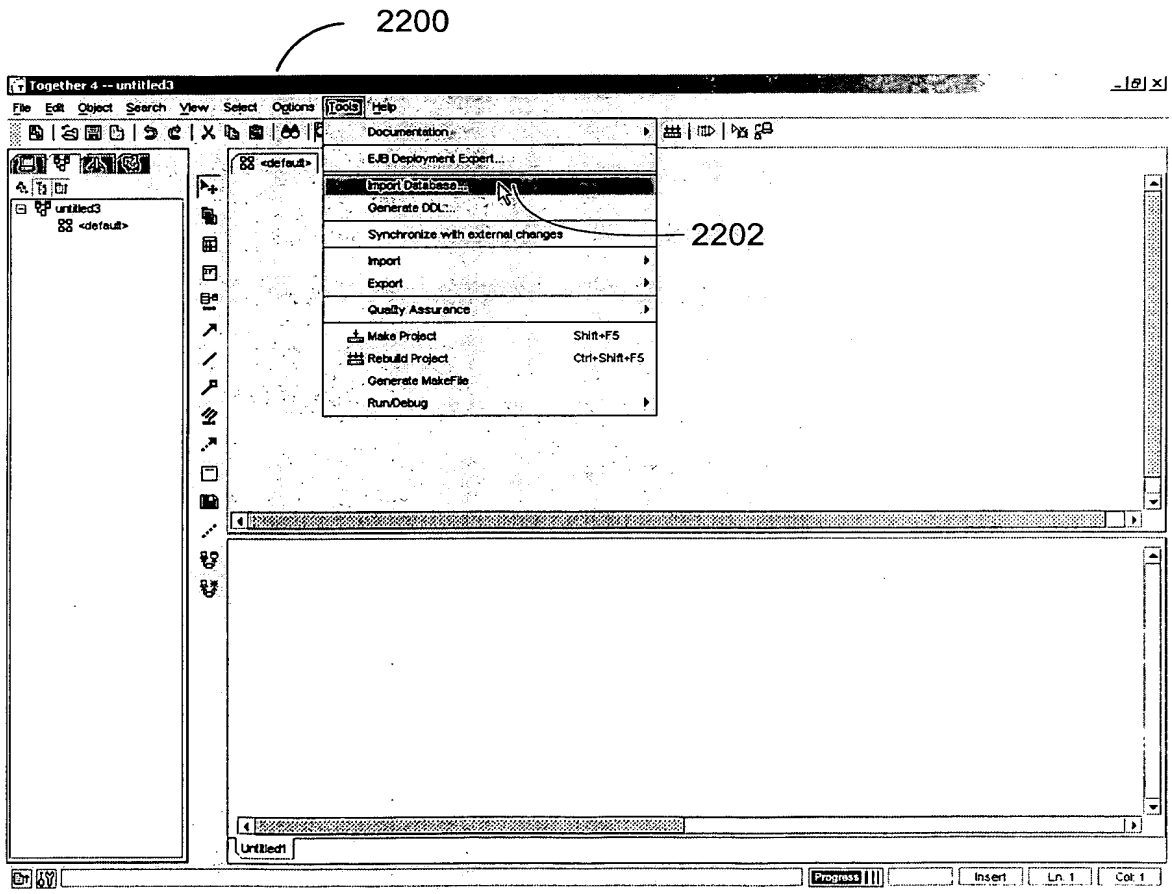

2200
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
Documentation...
EJB Deployment Expert...
Import Database...
Generate DDL...
Synchronize with external changes
Import
Export
Quality Assurance
Make Project Shift+F5
Rebuild Project Ctrl+Shift+F5
Generate MakeFile
Run/Debug
2202
untitled3
<default>
Untitled1
Progress
Insert
Ln 1
Col 1

FIG. 23

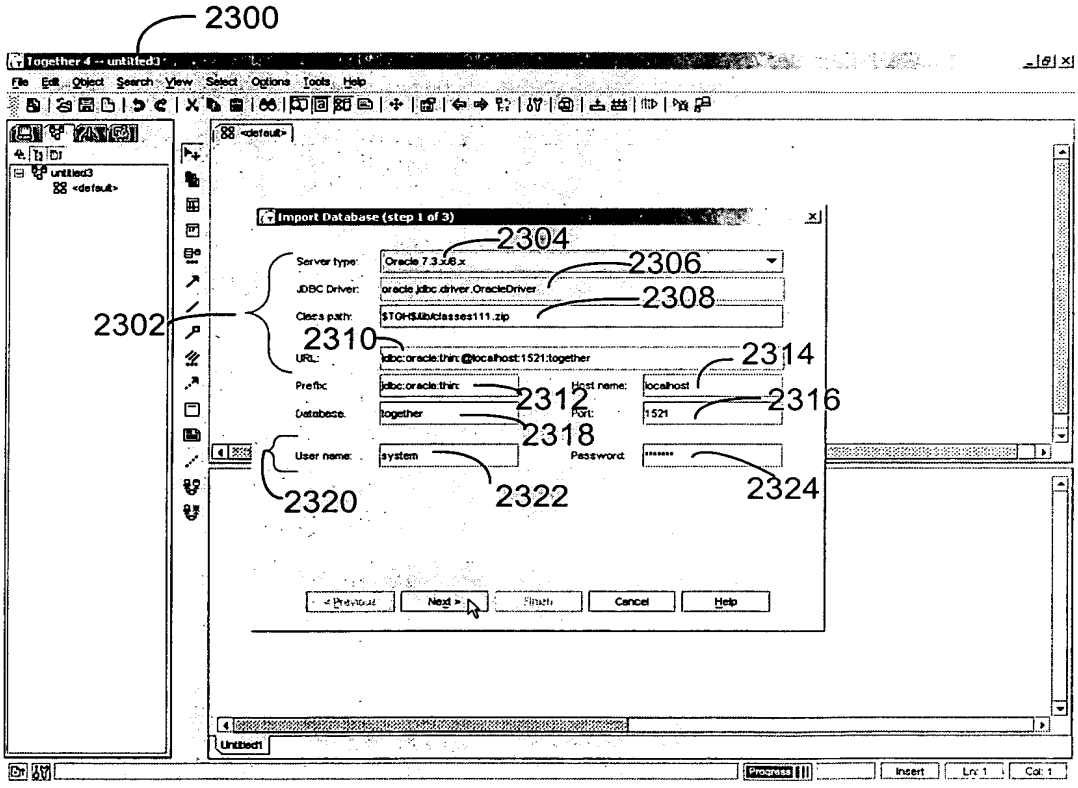

2300
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
untitled3
<default>
Import Database (step 1 of 3)
2304
Server type:
Oracle 7.3.x/8.x
2306
JDBC Driver:
oracle.jdbc.driver.OracleDriver
2308
Class path:
TOH\lib\classes111.zip
2302
2310
URL:
jdbc:oracle:thin:@localhost:1521:together
2314
Prefix:
jdbc:oracle:thin:
2312
Host name:
localhost
2316
Database:
together
2318
Port:
1521
User name:
system
Password:
2320
2322
2324
< Previous
Next >
Finish
Cancel
Help
Untitled1
Insert
Ln: 1
Col: 1

FIG. 24

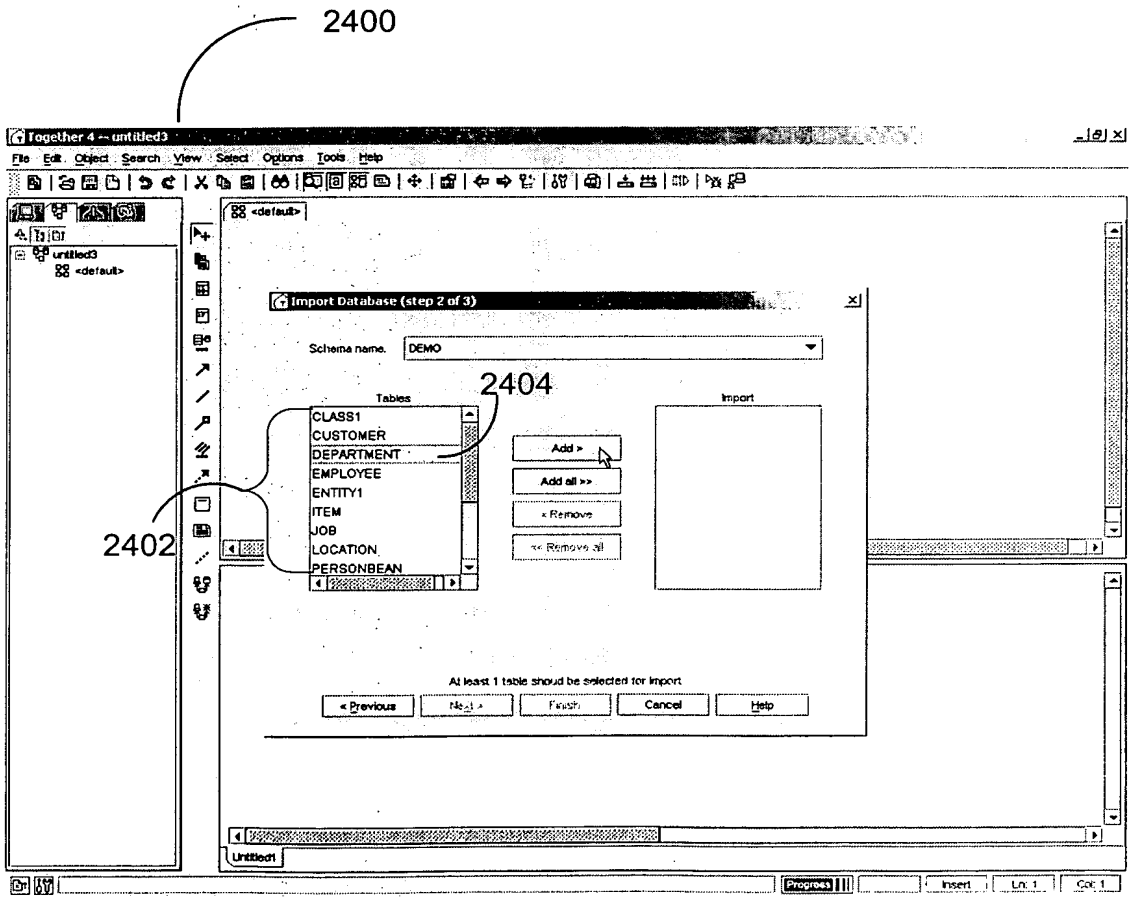

2400
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
untitled3
<default>
Import Database (step 2 of 3)
Schema name.
DEMO
2404
Tables
CLASS1
CUSTOMER
DEPARTMENT
EMPLOYEE
ENTITY1
ITEM
JOB
LOCATION
PERSONBEAN
Import
Add >
Add all >>
< Remove
<< Remove all
2402
At least 1 table should be selected for import
< Previous
Next >
Finish
Cancel
Help
Untitled1
Progress
Insert
Ln: 1
Col: 1

FIG. 25

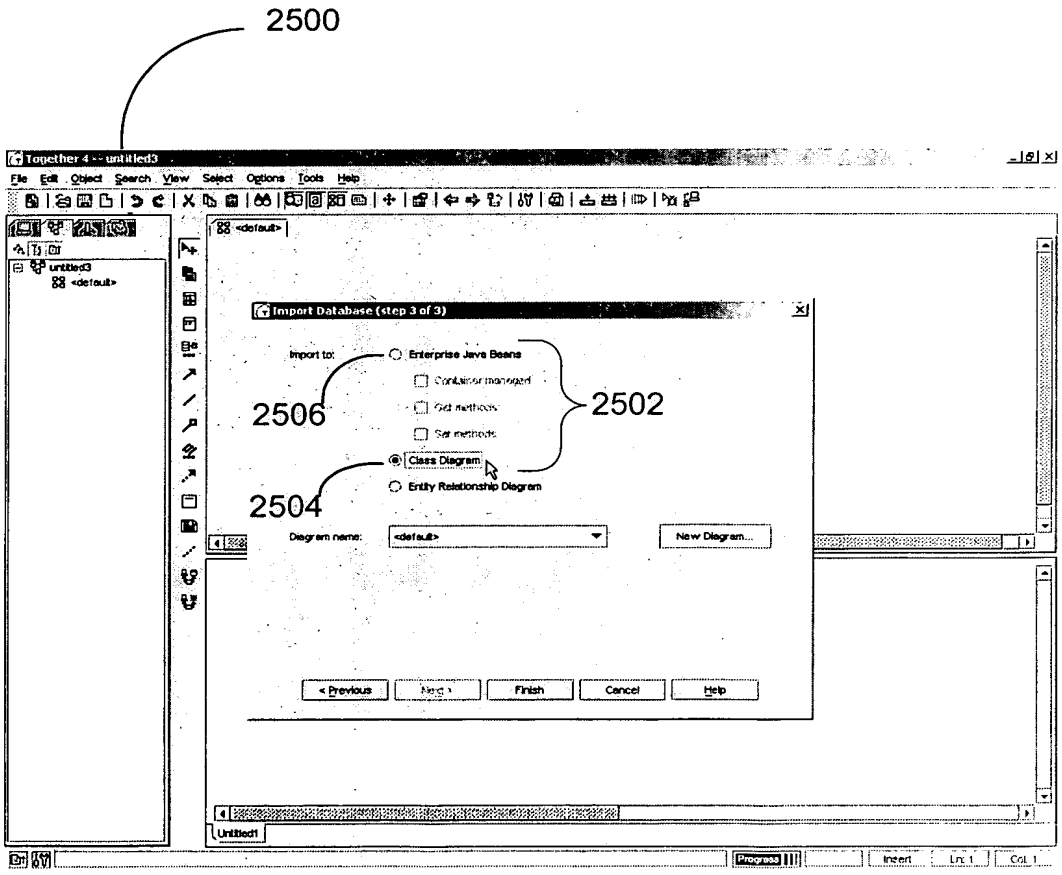

2500
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
untitled3
<default>
Import Database (step 3 of 3)
Import to:
Enterprise Java Beans
Container managed
Get methods
Set methods
Class Diagram
Entity Relationship Diagram
2506
2502
2504
Diagram name:
<default>
New Diagram...
< Previous
Next >
Finish
Cancel
Help
Untitled1
Progress
Insert
Ln 1
Col 1

FIG. 26

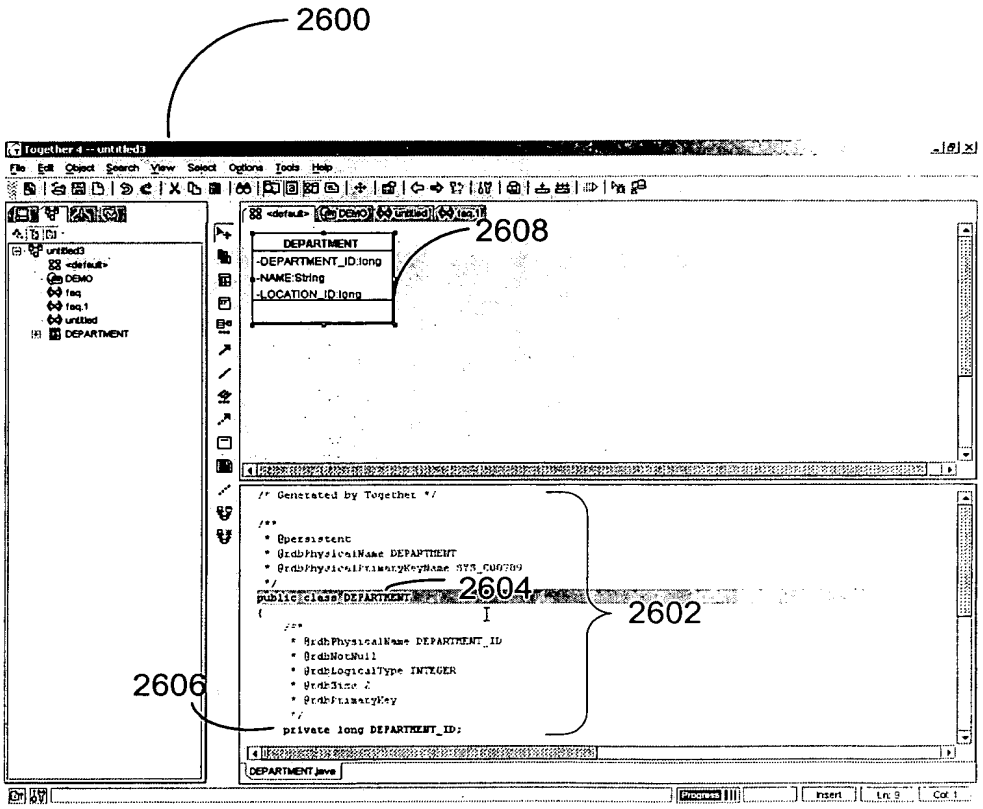

2600
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
untitled3
<default>
DEMO
faq
faq1
untitled
DEPARTMENT
DEPARTMENT
-DEPARTMENT_ID:long
-NAME:String
-LOCATION_ID:long
2608
/* Generated by Together */
/**
* @persistent
* @rdbPhysicalName DEPARTMENT
*/
public class DEPARTMENT
{
/**
* @rdbPhysicalName DEPARTMENT_ID
* @rdbNotNull
* @rdbLogicalType INTEGER
* @rdbSize 2
* @rdbPrimaryKey
*/
private long DEPARTMENT_ID;
2604
2602
2606
DEPARTMENT.java
Process
Insert
Ln: 9
Col: 1

FIG. 27

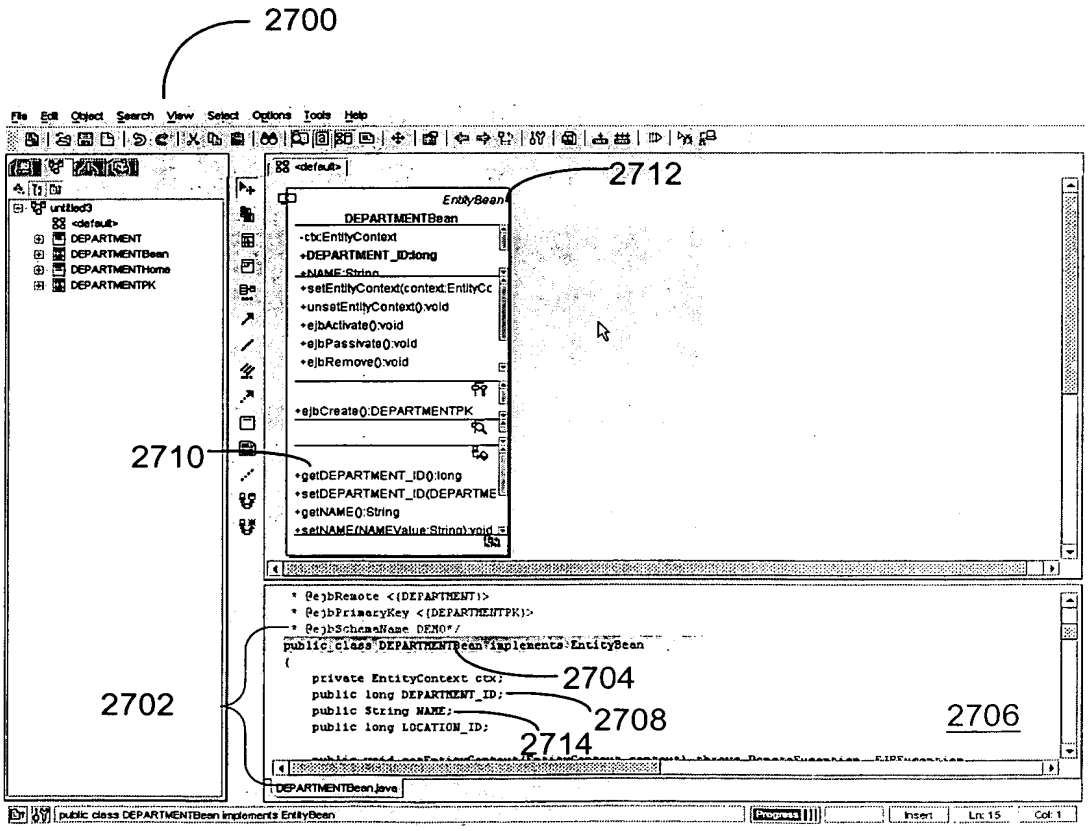

2700
File Edit Object Search View Select Options Tools Help
untitled3
<default>
DEPARTMENT
DEPARTMENTBean
DEPARTMENTHome
DEPARTMENTPK
2712
EntityBean
DEPARTMENTBean
-ctx:EntityContext
+DEPARTMENT_ID:long
+NAME:String
+setEntityContext(context:EntityCc
+unsetEntityContext():void
+ejbActivate():void
+ejbPassivate():void
+ejbRemove():void
+ejbCreate():DEPARTMENTPK
2710
+getDEPARTMENT_ID():long
+setDEPARTMENT_ID(DEPARTME
+getNAME():String
+setNAME(NAMEValue:String):void
* @ejbRemote <{DEPARTMENT}>
* @ejbPrimaryKey <{DEPARTMENTPK}>
* @ejbSchemaName DEMO*/
public class DEPARTMENTBean implements EntityBean
{
private EntityContext ctx;
public long DEPARTMENT_ID;
public String NAME;
public long LOCATION_ID;
2704
2708
2714
2706
2702
DEPARTMENTBean.java
public class DEPARTMENTBean implements EntityBean
Insert
Ln: 15
Col: 1

FIG. 28

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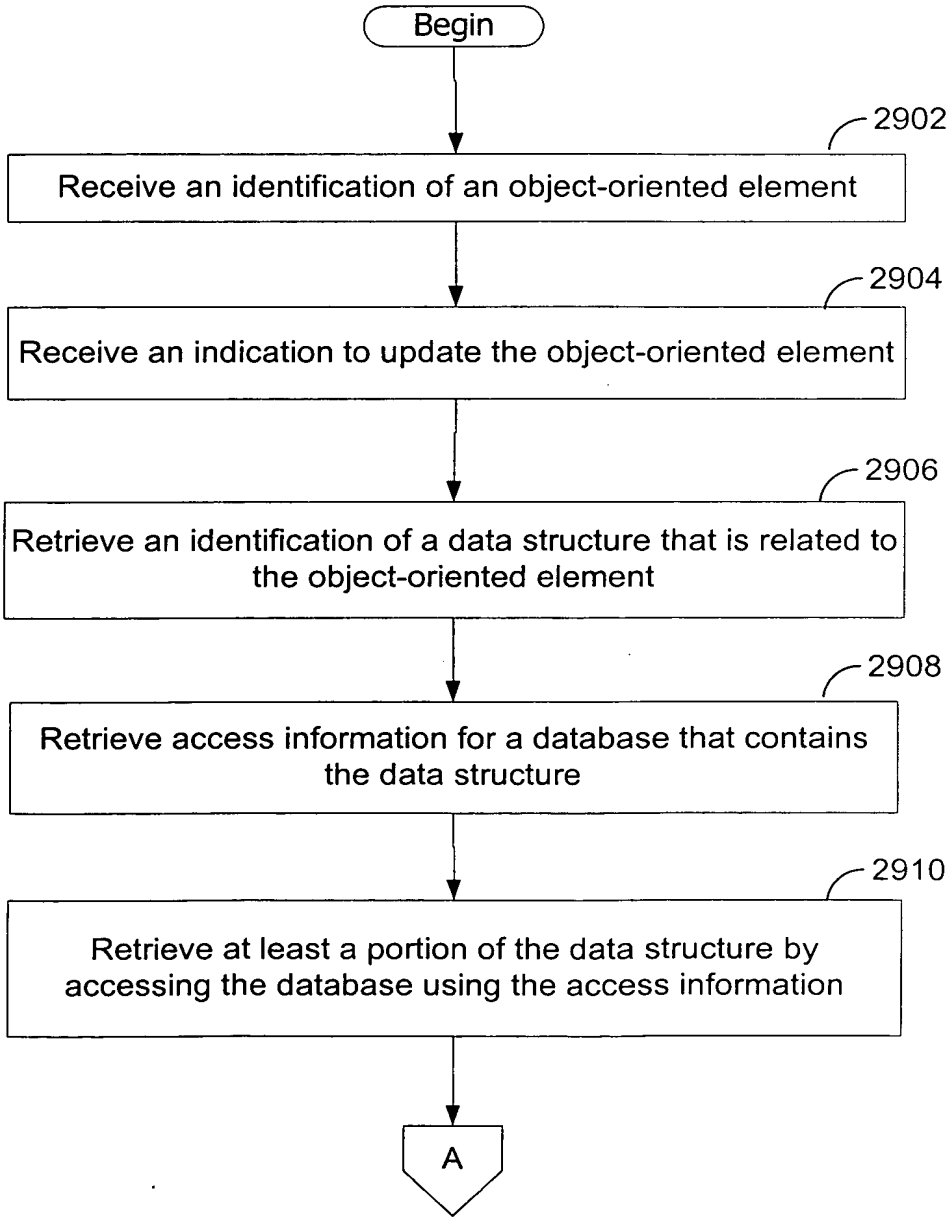
```
/* Generated by Together */
import  javax.ejb.EntityBean;
import  javax.ejb.EntityContext;
import  java.rmi.RemoteException;
import  javax.ejb.EJBException;
import  javax.ejb.CreateException;
import  java.sql.SQLException;

/**
 * @ejbHome <{ DEPARTMENTHome}>
 * @ejbRemote <{DEPARTMENT}>
 * @ejbPrimaryKey <{  DEPARTMENTPK}>
 * @ejbSchemaName DEMO
 * @ejbStructureID DEPARTMENT
 * @ejbACCESS Server: Oracle 7.3x/8x
 * @ejbACCESS Driver:   oracle.jdbc.driver.OracleDriver,
 * @ejbACCESS  Classpath: $ TGH$/lib/ classes111.zip,
 * @ejbACCESS   URL:jdbc:oracle:thin@localhost:1521:together
*/
public class   DEPARTMENTBean implements    EntityBean
{
    private  EntityContext  ctx;
    public long   DEPARTMENT_ID;
    public String NAME;
    public long   LOCATION_ID;

    public void   setEntityContext(  EntityContext context) throws
RemoteException,   EJBException
    {
        ctx = context;
    }

    public void   unsetEntityContext() throws    RemoteException,
EJBException
    {
        ctx = null;
    }

    public void   ejbActivate() throws   RemoteException,   EJBException
    {
    }

    public void   ejbPassivate() throws   RemoteException,   EJBException
    {
    }

    public void   ejbRemove() throws   RemoteException,   EJBException
    {
    }

    public void   ejbStore() throws   RemoteException,   EJBException
    {
    }

    public void   ejbLoad() throws   RemoteException,   EJBException
    {
    }
```

2804

Exhibit 1004, page 1004

FIG. 29A


Begin
2902
Receive an identification of an object-oriented element
2904
Receive an indication to update the object-oriented element
2906
Retrieve an identification of a data structure that is related to the object-oriented element
2908
Retrieve access information for a database that contains the data structure
2910
Retrieve at least a portion of the data structure by accessing the database using the access information
A

Patent Application Publication

FIG. 29B

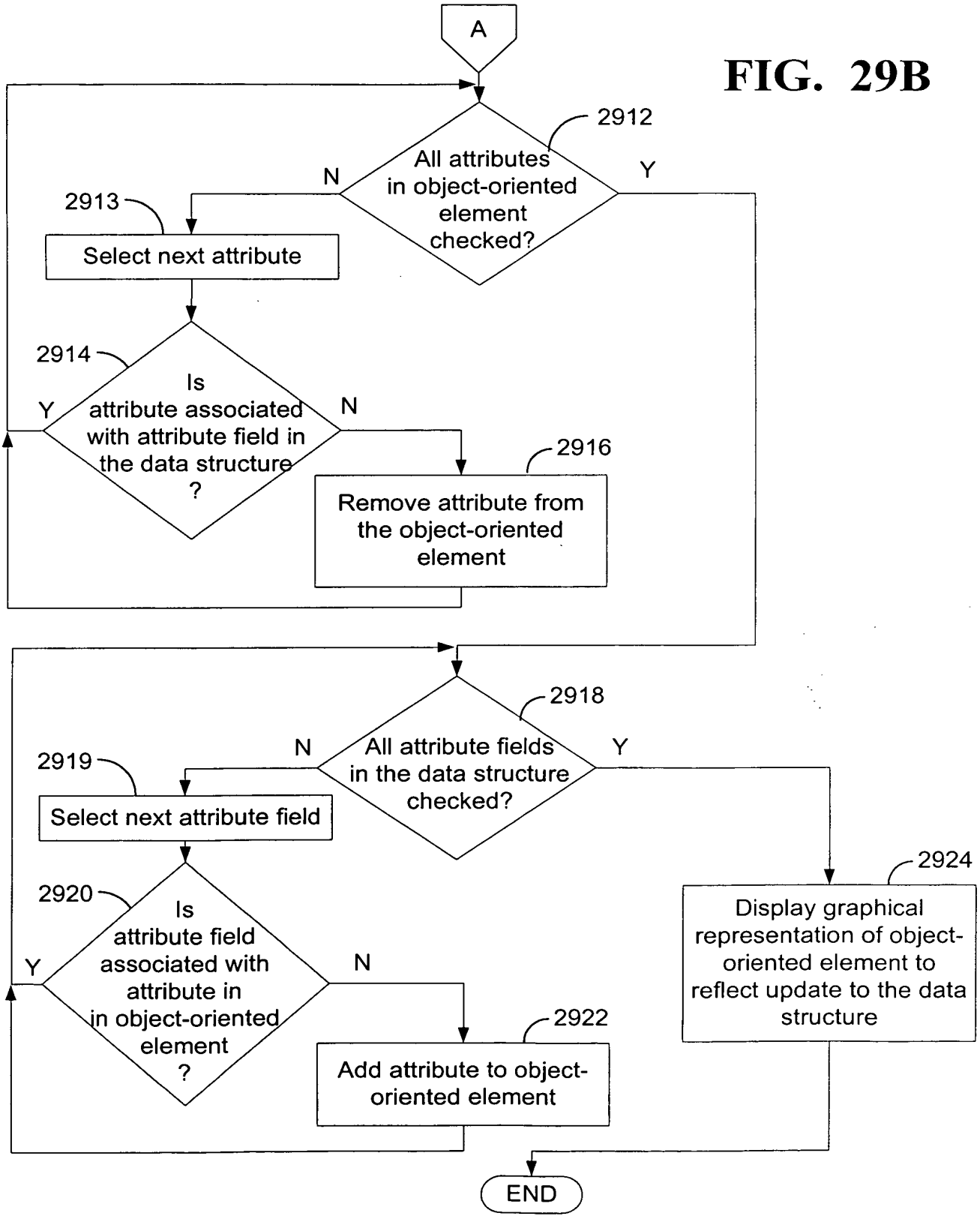


FIG. 30

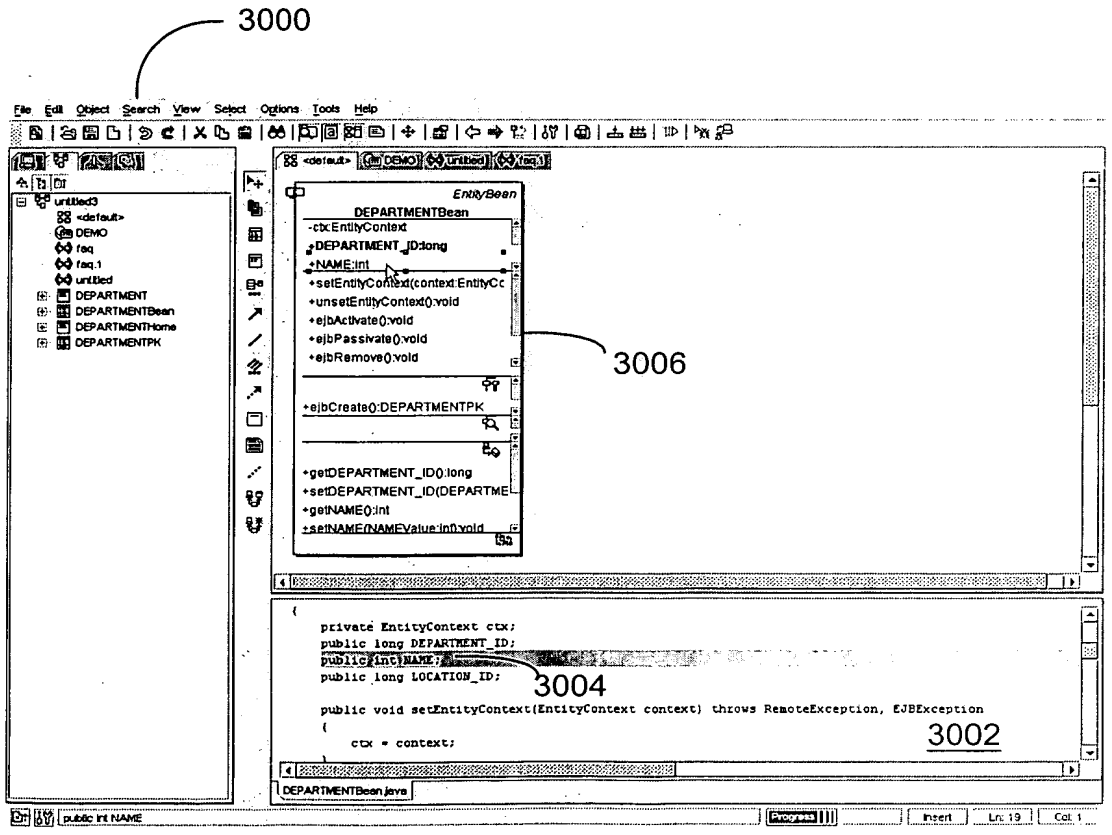

3000
File Edit Object Search View Select Options Tools Help
untitled3
<default>
DEMO
faq
faq.1
untitled
DEPARTMENT
DEPARTMENTBean
DEPARTMENTHome
DEPARTMENTPK
EntityBean
DEPARTMENTBean
-ctx:EntityContext
+DEPARTMENT_ID:long
+NAME:int
+setEntityContext(context:EntityC
+unsetEntityContext():void
+ejbActivate():void
+ejbPassivate():void
+ejbRemove():void
+ejbCreate():DEPARTMENTPK
+getDEPARTMENT_ID():long
+setDEPARTMENT_ID(DEPARTME
+getNAME():int
+setNAME(NAMEValue:int):void
3006
private EntityContext ctx;
public long DEPARTMENT_ID;
public int NAME;
public long LOCATION_ID;
3004
public void setEntityContext(EntityContext context) throws RemoteException, EJBException
ctx = context;
3002
DEPARTMENTBean.java
public int NAME
Insert
Ln: 19
Col: 1

FIG. 31A

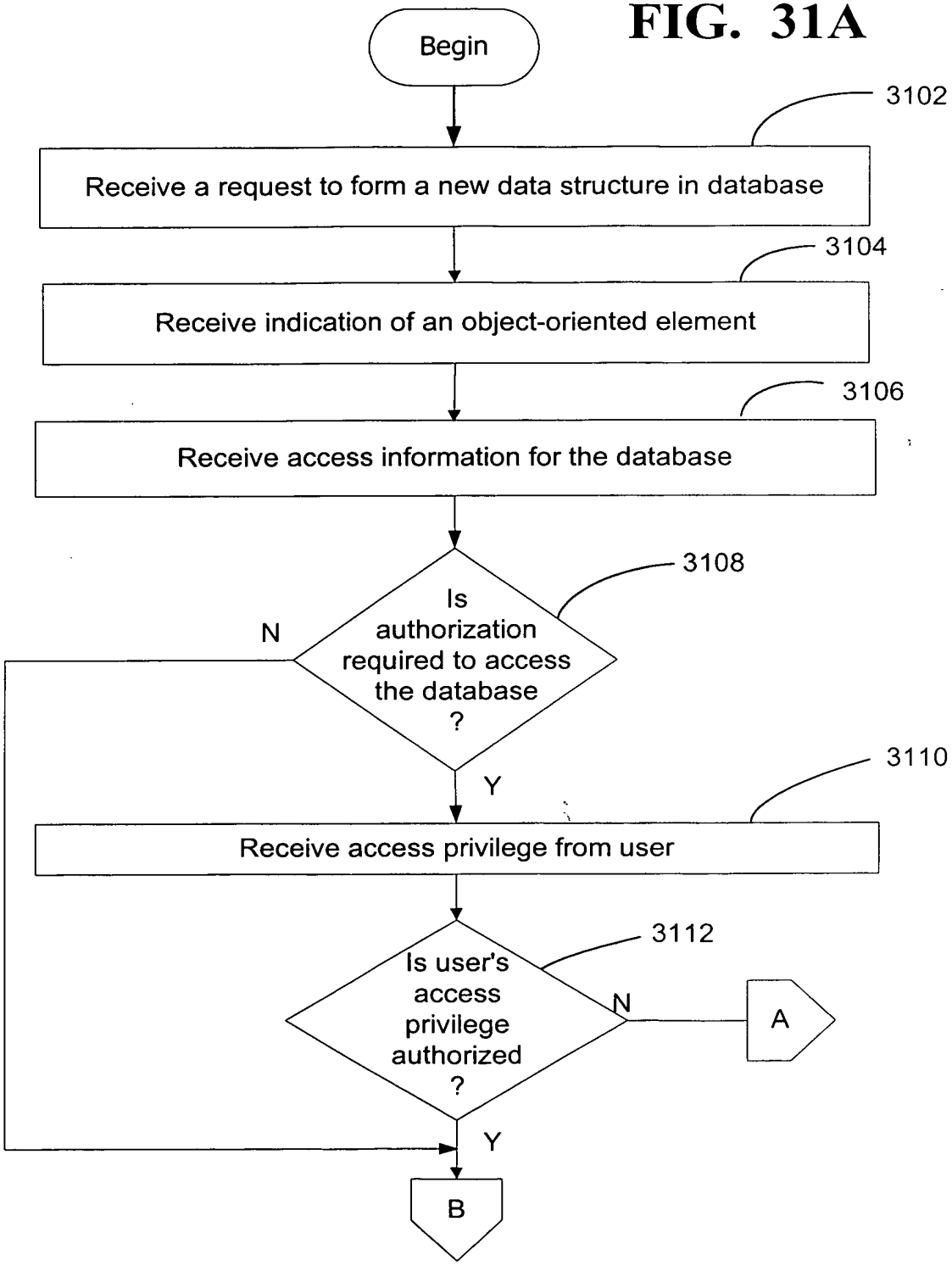

Begin
3102
Receive a request to form a new data structure in database
3104
Receive indication of an object-oriented element
3106
Receive access information for the database
3108
Is authorization required to access the database ?
N
Y
3110
Receive access privilege from user
3112
Is user's access privilege authorized ?
N
A
Y
B

FIG. 31B

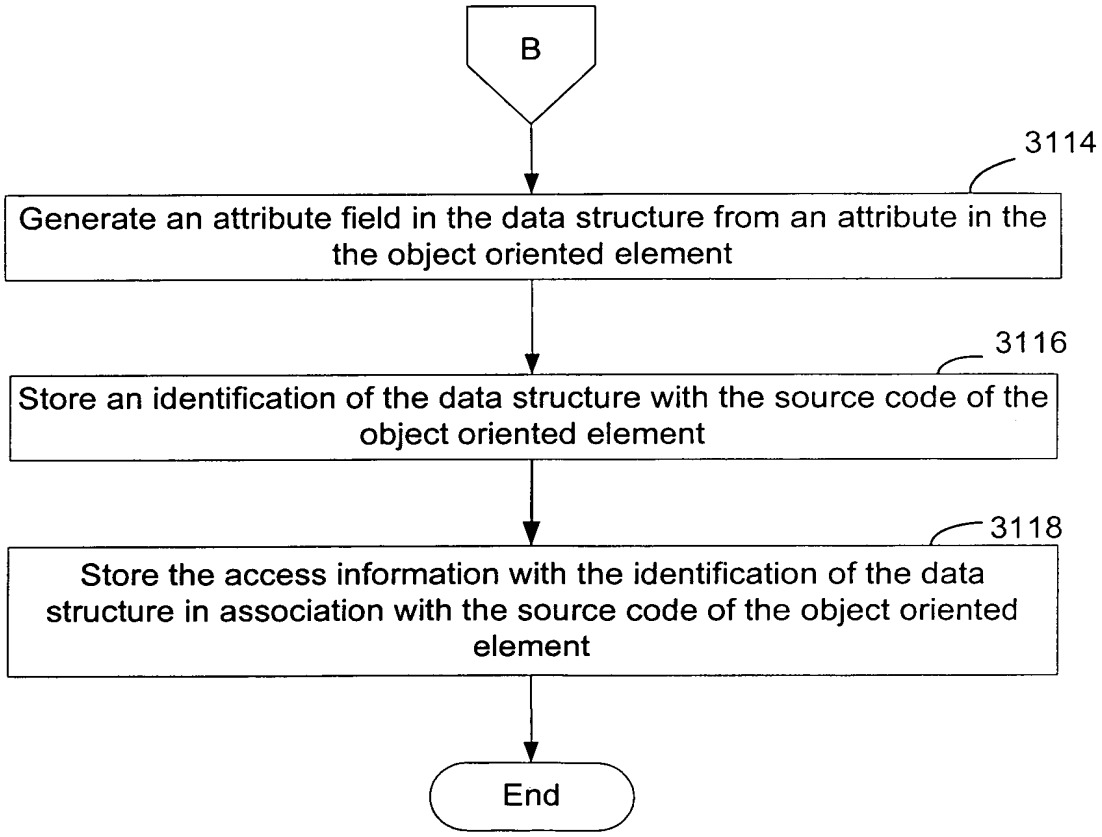

B
3114
Generate an attribute field in the data structure from an attribute in the the object oriented element
3116
Store an identification of the data structure with the source code of the object oriented element
3118
Store the access information with the identification of the data structure in association with the source code of the object oriented element
End

FIG. 32

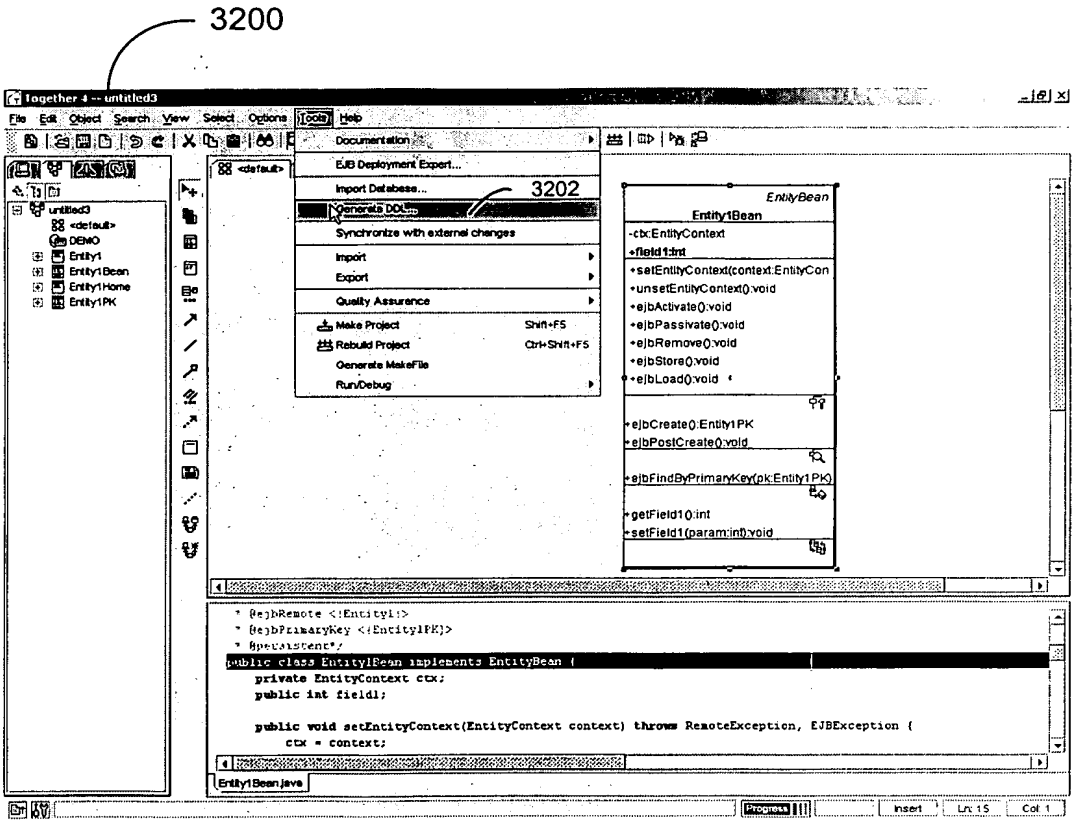

3200
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
Documentation
EJB Deployment Expert...
Import Database...
Generate DDL...
3202
Synchronize with external changes
Import
Export
Quality Assurance
Make Project Shift+F5
Rebuild Project Ctrl+Shift+F5
Generate MakeFile
Run/Debug
untitled3
<default>
DEMO
Entity1
Entity1Bean
Entity1Home
Entity1PK
EntityBean
Entity1Bean
-ctx:EntityContext
+field1:int
+setEntityContext(context:EntityCon
+unsetEntityContext():void
+ejbActivate():void
+ejbPassivate():void
+ejbRemove():void
+ejbStore():void
+ejbLoad():void
+ejbCreate():Entity1PK
+ejbPostCreate():void
+ejbFindByPrimaryKey(pk:Entity1PK)
+getField1():int
+setField1(param:int):void
* @ejbRemote <{Entity1}>
* @ejbPrimaryKey <{Entity1PK}>
* @persistent*/
public class Entity1Bean implements EntityBean {
private EntityContext ctx;
public int field1;
public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
ctx = context;
Entity1Bean.java
Insert
Ln: 15
Col: 1

FIG. 33

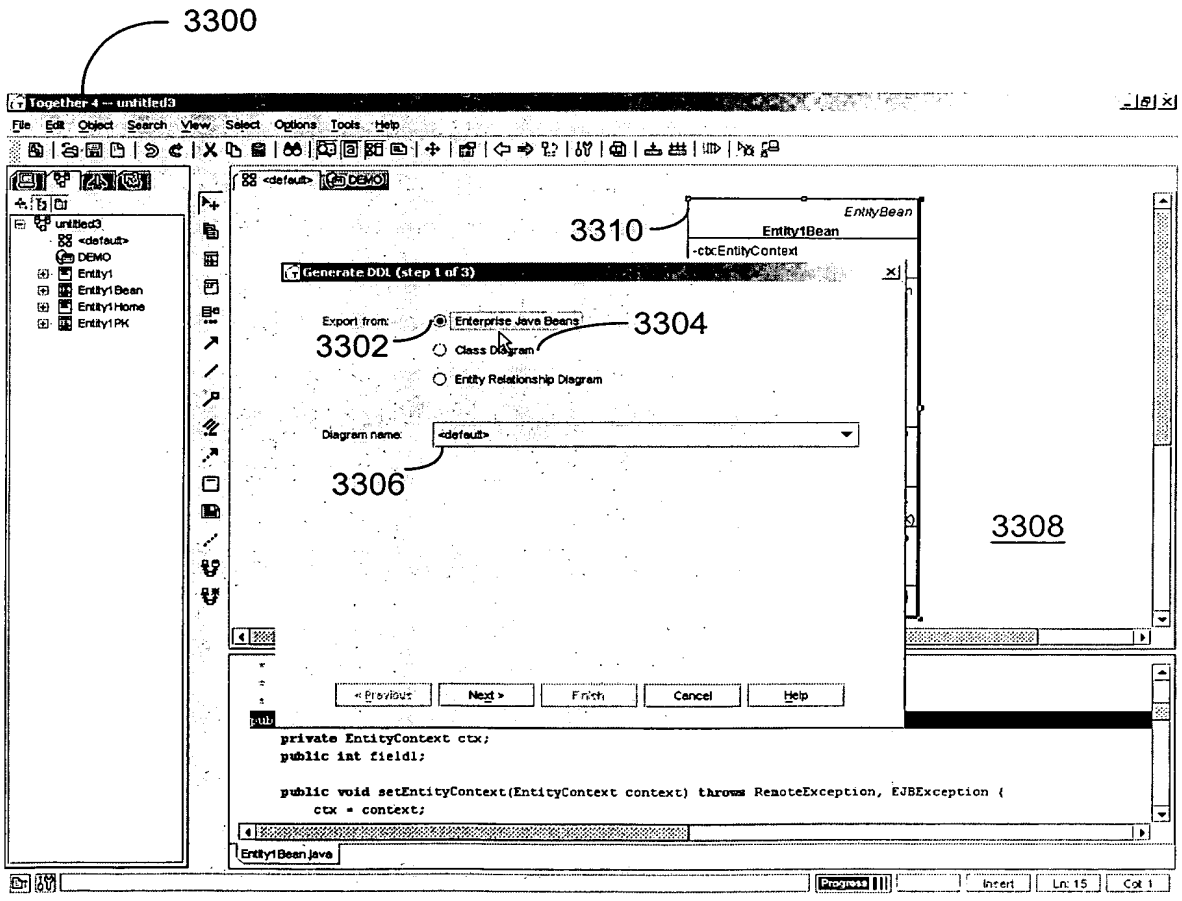

3300
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
untitled3
<default>
DEMO
Entity1
Entity1Bean
Entity1Home
Entity1PK
3310
EntityBean
Entity1Bean
-ctx:EntityContext
Generate DDL (step 1 of 3)
Export from:
Enterprise Java Beans
3302
3304
Class Diagram
Entity Relationship Diagram
Diagram name:
<default>
3306
3308
< Previous
Next >
Finish
Cancel
Help
private EntityContext ctx;
public int field1;
public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
ctx = context;
Entity1Bean.java
Insert
Ln: 15
Col: 1

FIG. 34

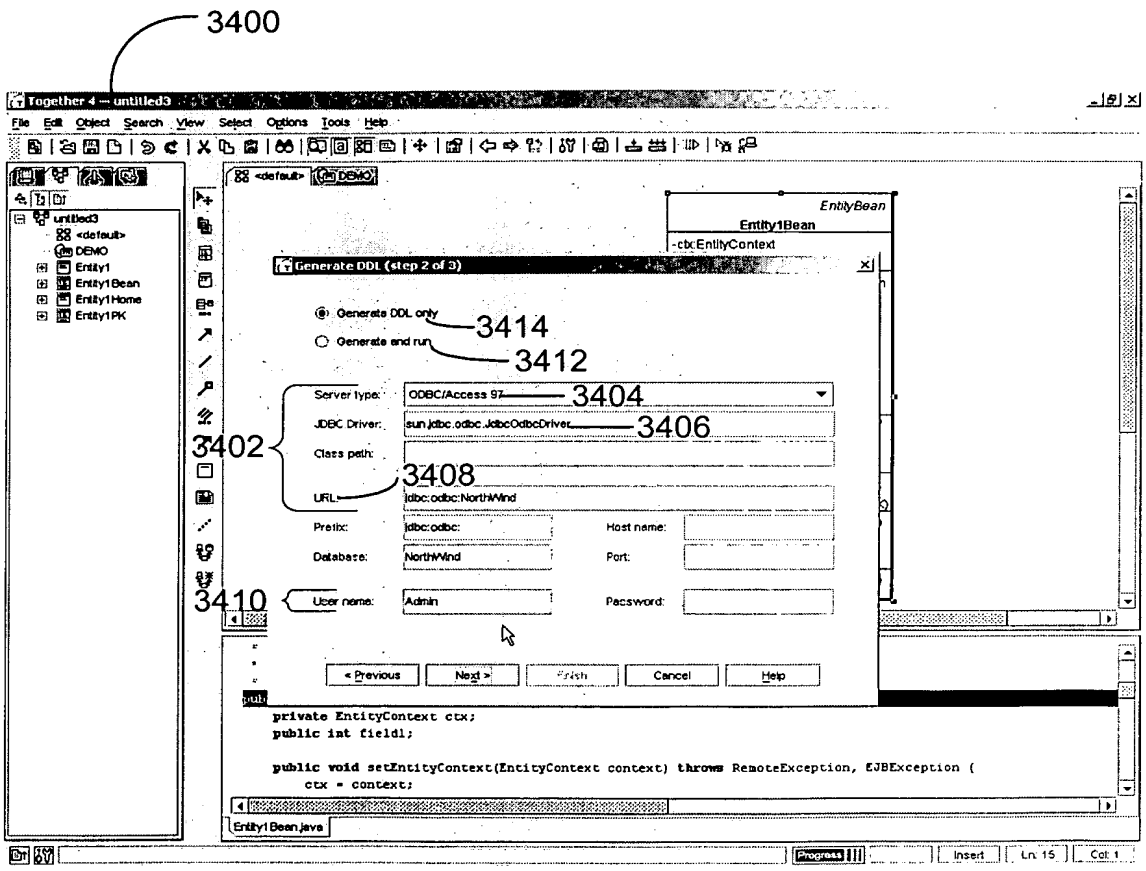

3400
Together 4 — untitled3
File Edit Object Search View Select Options Tools Help
untitled3
<default>
DEMO
Entity1
Entity1Bean
Entity1Home
Entity1PK
EntityBean
Entity1Bean
-ctx:EntityContext
Generate DDL (step 2 of 3)
Generate DDL only
Generate and run
3414
3412
Server type:
ODBC/Access 97
3404
JDBC Driver:
sun.jdbc.odbc.JdbcOdbcDriver
3406
Class path:
3402
3408
URL:
jdbc:odbc:NorthWind
Prefix:
jdbc:odbc:
Host name:
Database:
NorthWind
Port:
3410
User name:
Admin
Password:
< Previous
Next >
Finish
Cancel
Help
private EntityContext ctx;
public int field1;
public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
ctx = context;
Entity1Bean.java
Insert
Ln: 15
Col: 1

FIG. 35

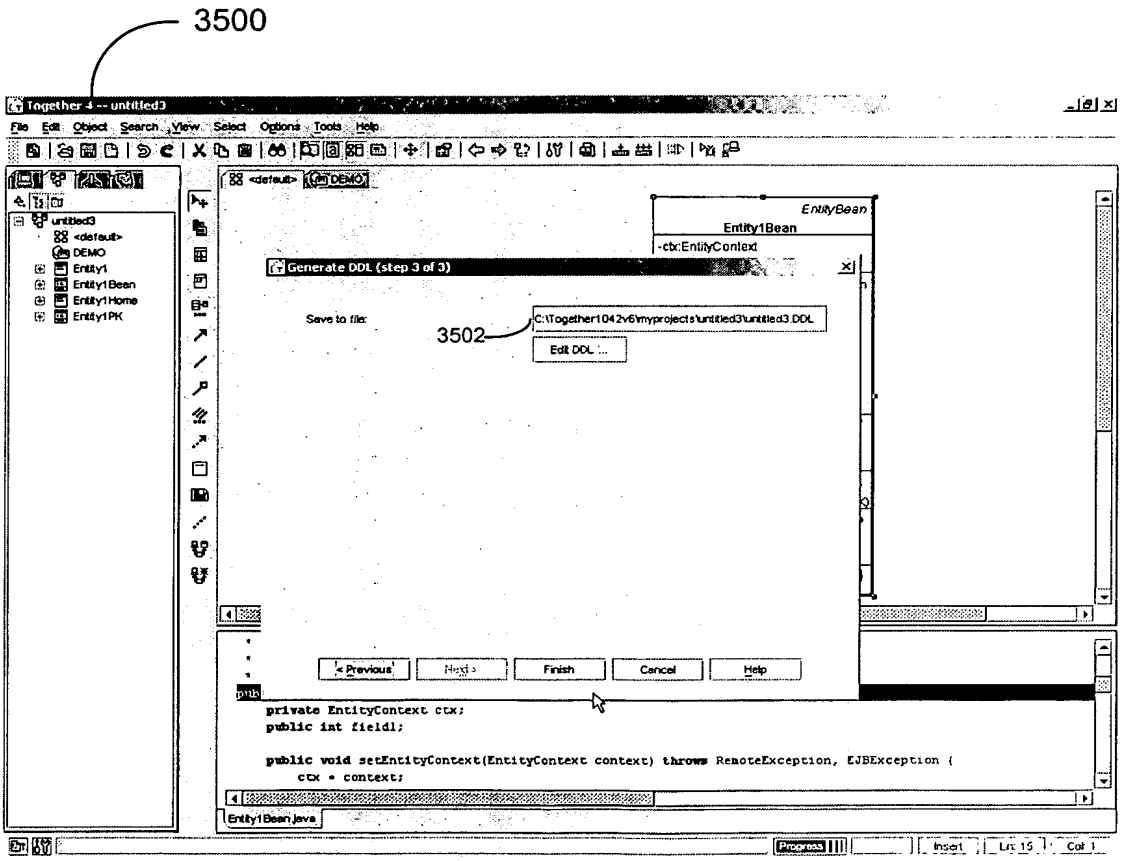

3500
Together 4 -- untitled3
File Edit Object Search View Select Options Tools Help
untitled3
<default>
DEMO
Entity1
Entity1Bean
Entity1Home
Entity1PK
<default>
DEMO
EntityBean
Entity1Bean
-ctx:EntityContext
Generate DDL (step 3 of 3)
Save to file:
C:\Together1042v6\myprojects\untitled3\untitled3.DDL
3502
Edit DDL ...
< Previous
Next >
Finish
Cancel
Help
private EntityContext ctx;
public int field1;
public void setEntityContext(EntityContext context) throws RemoteException, EJBException {
ctx = context;
Entity1Bean.java
Insert

FIG. 36A

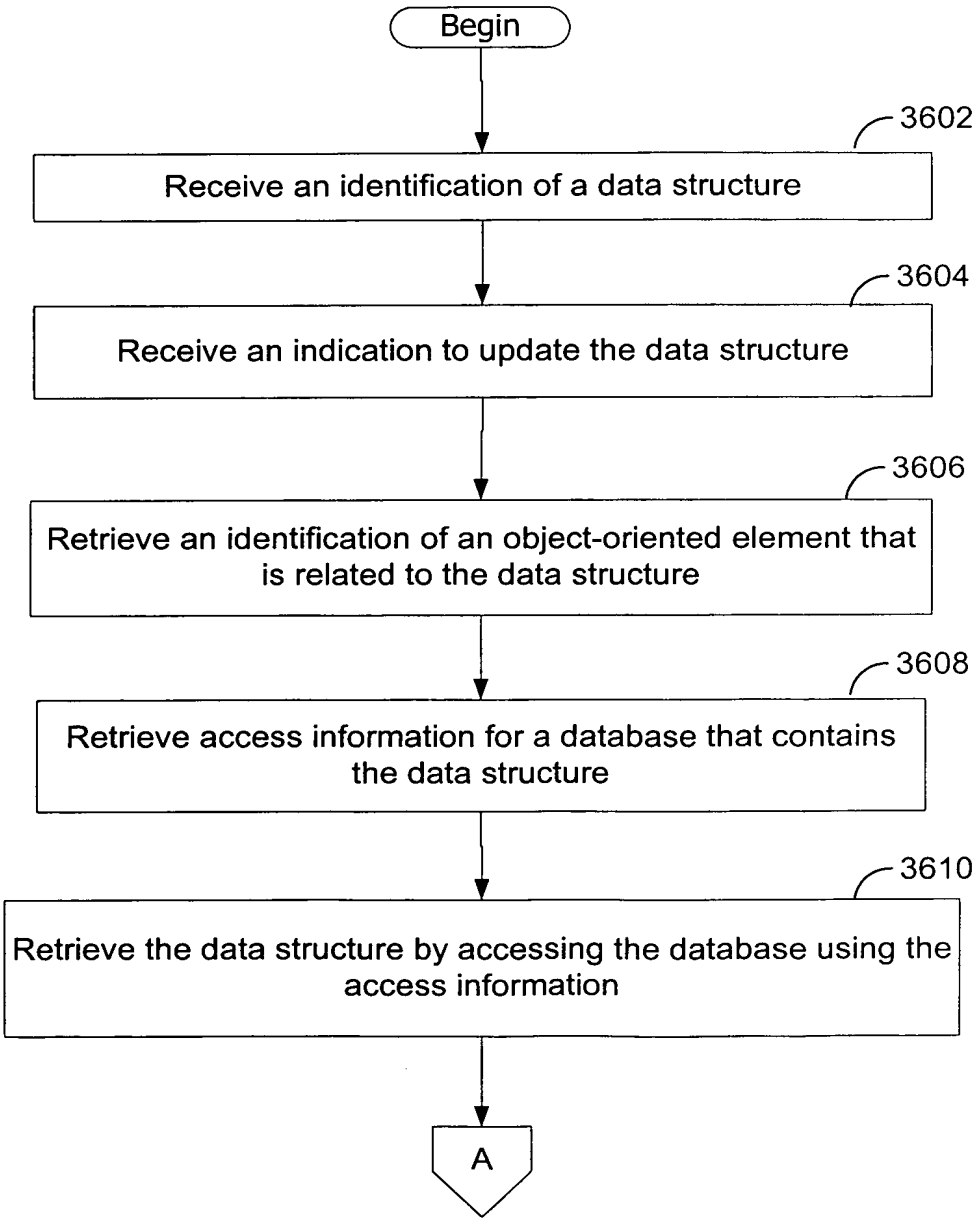
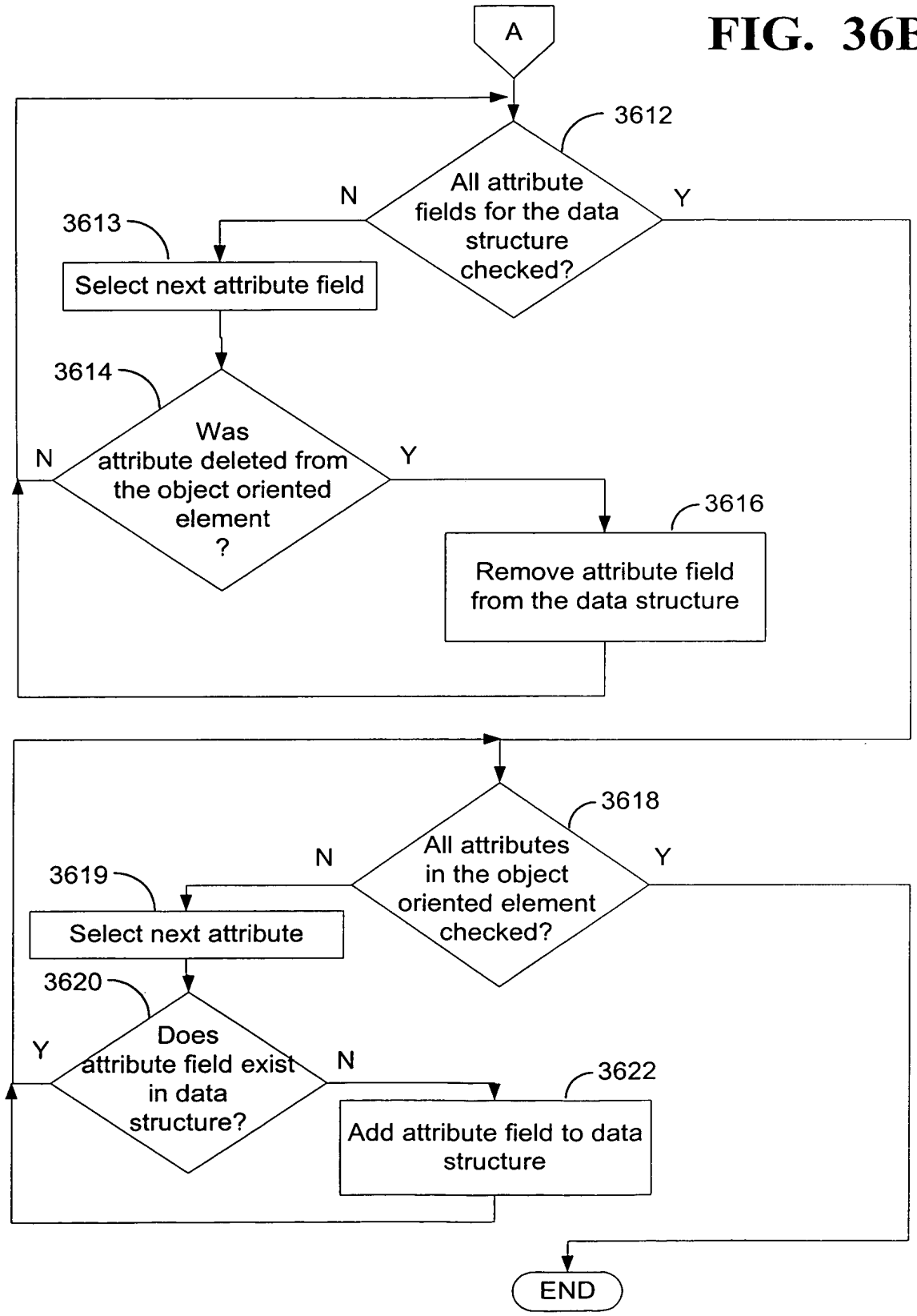

Begin
3602
Receive an identification of a data structure
3604
Receive an indication to update the data structure
3606
Retrieve an identification of an object-oriented element that is related to the data structure
3608
Retrieve access information for a database that contains the data structure
3610
Retrieve the data structure by accessing the database using the access information
A

FIG. 36B


A
3612
All attribute fields for the data structure checked?
N
Y
3613
Select next attribute field
3614
Was attribute deleted from the object oriented element ?
N
Y
3616
Remove attribute field from the data structure
3618
All attributes in the object oriented element checked?
N
Y
3619
Select next attribute
3620
Does attribute field exist in data structure?
Y
N
3622
Add attribute field to data structure
END